



AGENCY FOR HEALTHCARE RESEARCH AND QUALITY



# The Healthcare Cost and Utilization Project (HCUP)

## Day 1: Planning Your HCUP Analysis

Agency for Healthcare Research and Quality  
Virtual Workshop ♦ November 2, 2022

# Workshop Agenda: Day 1

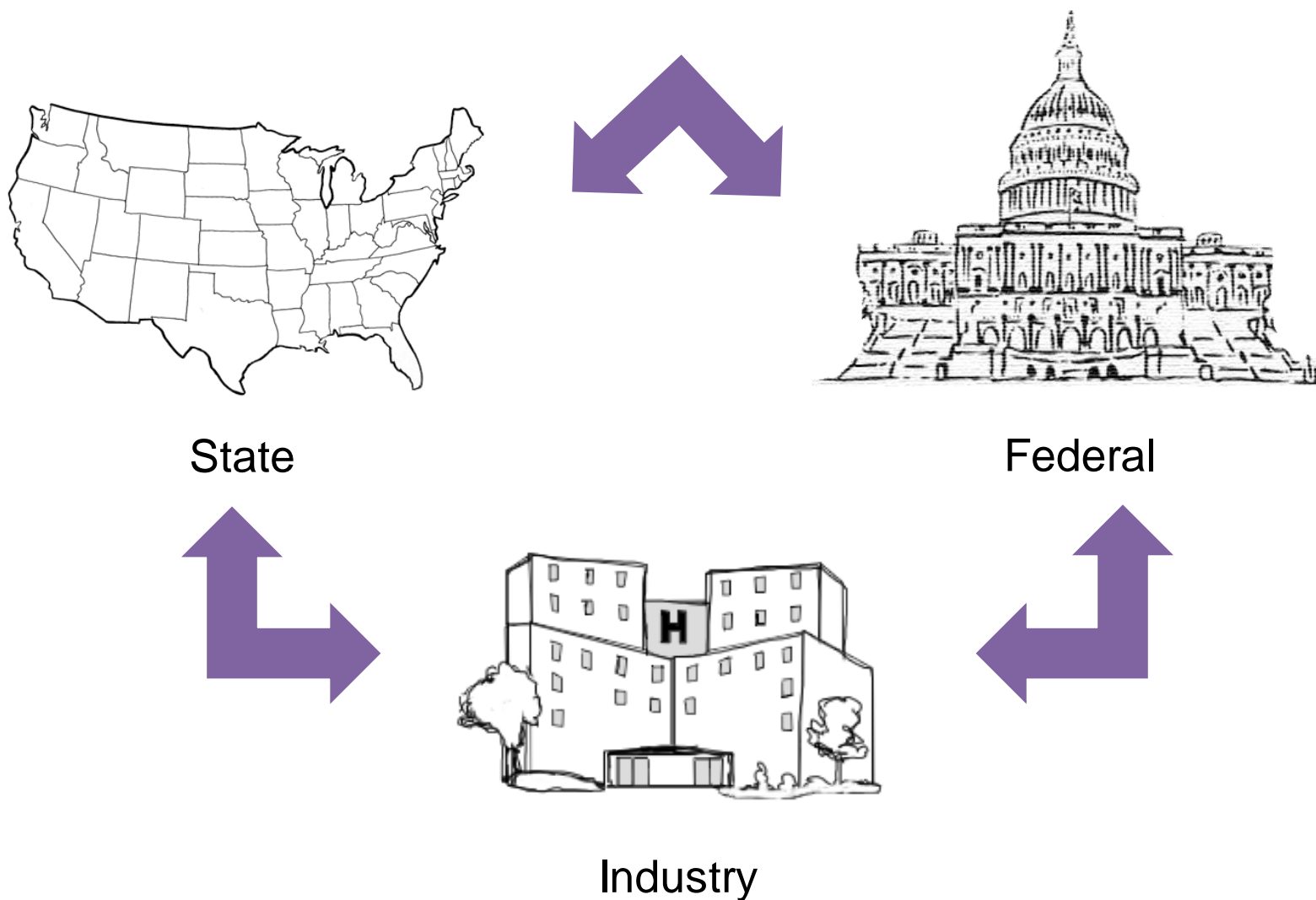


Topic	Duration	Start Time (PST/EST)
<b>Brief Overview of HCUP</b>	20 min	9:00 a.m./12:00 p.m.
Consideration #1: Deciding Which HCUP Database to Use	40 min	9:20 a.m./12:20 p.m.
Q&A	10 min	10:00 a.m./1:00 p.m.
<i>Break</i>	10 min	10:10 a.m./1:10 p.m.
Consideration #2: Using Multi-Year HCUP Data for Your Analysis	15 min	10:20 a.m./1:20 p.m.
Consideration #3: Defining Your Conditions and/or Procedures of Interest	60 min	10:35 p.m./1:35 p.m.
Brief Overview of HCUP-US Website Resources	10 min	11:35 p.m./2:35 p.m.
Q&A	15 min	11:45 p.m./2:45 p.m.

# Introduction to HCUP

What Is HCUP?

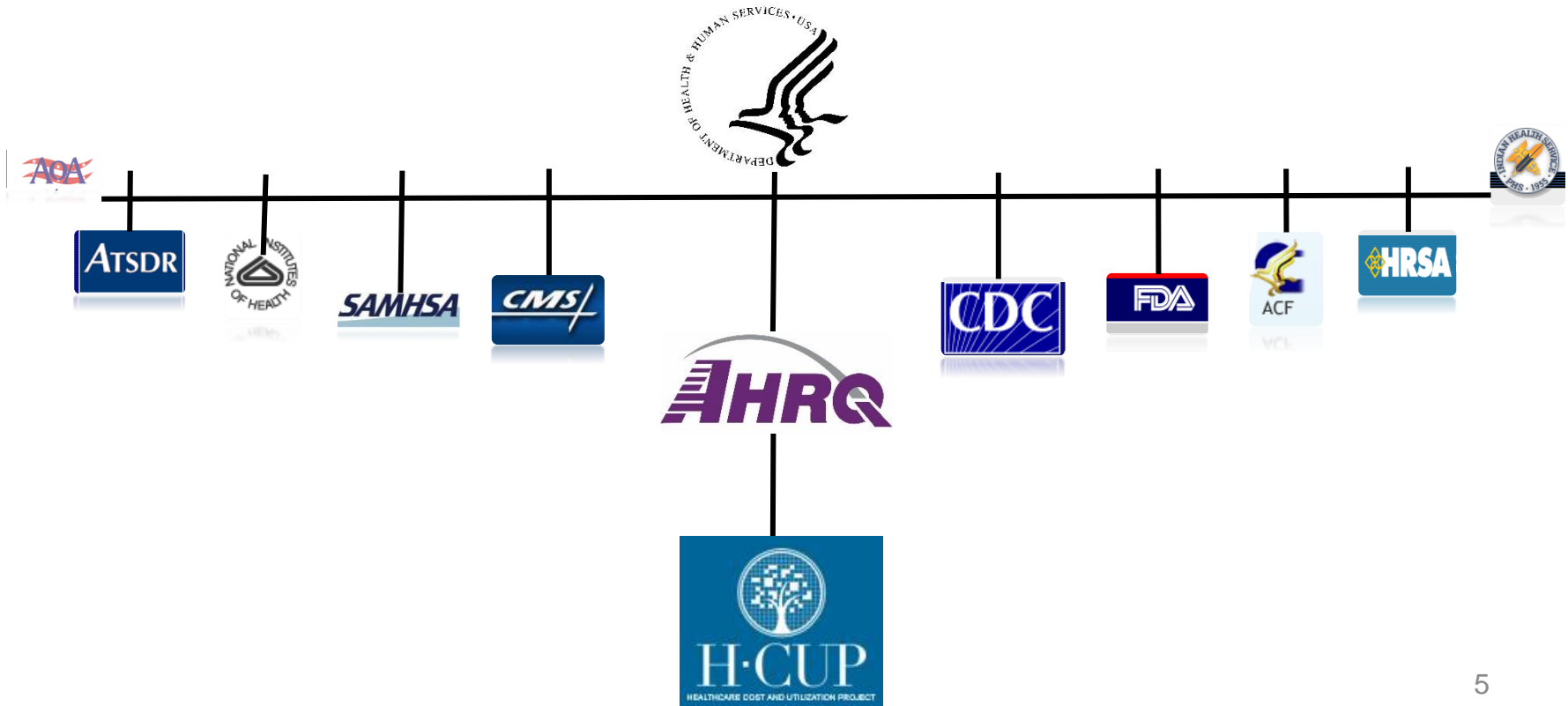
# The HCUP Partnership



# Sponsored by the Agency for Healthcare Research and Quality



The Agency for Healthcare Research and Quality (AHRQ) is a Federal agency under the Department of Health and Human Services.



# Available HCUP Resources

## Federal-State-Private Partnership

HCUP is a comprehensive set of **publicly available all-payer** healthcare data (including self-pay and those billed as “no charge”)



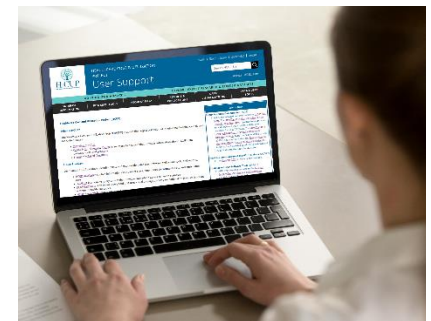
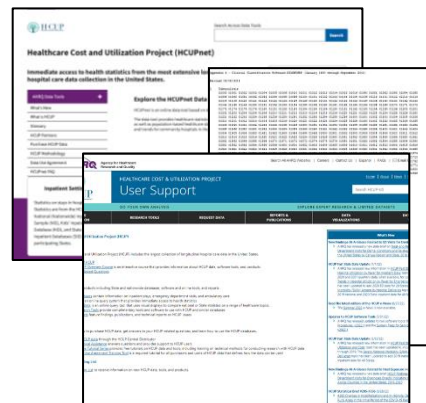
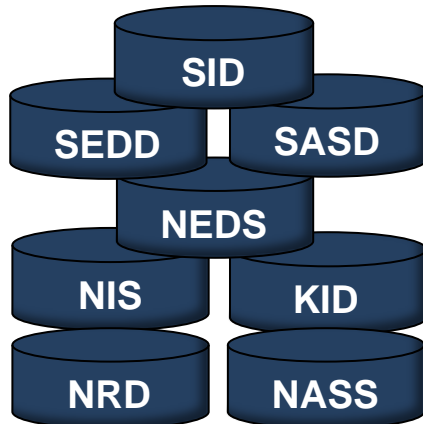
Includes **multi-year** inpatient and outpatient data based on **hospital billing** records

HCUP  
Databases

Online Tools

Analytics

User Support



# HCUP Data Partners



<b>Alaska</b> Department of Health and Social Services	<b>Montana</b> Hospital Association
<b>Alaska</b> Hospital and Healthcare Association	<b>Nebraska</b> Hospital Association
<b>Arizona</b> Department of Health Services	<b>Nevada</b> Department of Health and Human Services
<b>Arkansas</b> Department of Health	<b>New Hampshire</b> Department of Health & Human Services
<b>California</b> Department of Health Care Access and Information (HCAI)	<b>New Jersey</b> Department of Health
<b>Colorado</b> Hospital Association	<b>New Mexico</b> Department of Health
<b>Connecticut</b> Hospital Association	<b>New York</b> State Department of Health
<b>Delaware</b> Health Statistics Center & Office of Vital Statistics	<b>North Carolina</b> Department of Health and Human Services
<b>District of Columbia</b> Hospital Association	<b>North Dakota</b> (data provided by the Minnesota Hospital Association)
<b>Florida</b> Agency for Health Care Administration	<b>Ohio</b> Hospital Association
<b>Georgia</b> Hospital Association	<b>Oklahoma</b> State Department of Health
<b>Hawaii</b> Lauima Data Alliance	<b>Oregon</b> Healthy Authority
<b>Hawaii</b> University of Hawai'i at Hilo	<b>Oregon</b> Association of Hospitals and Health Systems
<b>Illinois</b> Department of Public Health	<b>Pennsylvania</b> Health Care Cost Containment Council
<b>Indiana</b> Hospital Association	<b>Rhode Island</b> Department of Health
<b>Iowa</b> Hospital Association	<b>South Carolina</b> Revenue and Fiscal Affairs Office
<b>Kansas</b> Hospital Association	<b>South Dakota</b> Association of Healthcare Organizations
<b>Kentucky</b> Cabinet for Health and Family Services	<b>Tennessee</b> Hospital Association
<b>Louisiana</b> Department of Health	<b>Texas</b> Department of State Health Services
<b>Maine</b> Health Data Organization	<b>Utah</b> Department of Health
<b>Maryland</b> Health Services Cost Review Commission	<b>Vermont</b> Association of Hospitals and Health Systems
<b>Massachusetts</b> Center for Health Information and Analysis	<b>Virginia</b> Health Information
<b>Michigan</b> Health & Hospital Association	<b>Washington</b> State Department of Health
<b>Minnesota</b> Hospital Association (provides data for Minnesota and North Dakota)	<b>West Virginia</b> Department of Health and Human Resources, Health Care Authority
<b>Mississippi</b> State Department of Health	<b>Wisconsin</b> Department of Health Services
<b>Missouri</b> Hospital Industry Data Institute	<b>Wyoming</b> Hospital Association

What Is the  
Foundation of  
HCUP Data?



Samp CMS-1500		1500	
<b>HEALTH INSURANCE CLAIM FORM</b>			
APPROVED BY NATIONAL UNIFORM CLAIM COMMITTEE 1995			
<div style="display: flex; justify-content: space-between;"> <div> <p>1 MEDICARE <input type="checkbox"/> MEDICAID <input type="checkbox"/> TRICARE <input type="checkbox"/> CHAMPVA <input type="checkbox"/> GROUP <input type="checkbox"/> SELF <input type="checkbox"/></p> <p>2 PATIENT'S NAME (Last Name, First Name, Middle Initial) <b>Smith, Bob A.</b></p> <p>3 PATIENT'S ADDRESS (No. Street) <b>123 Paradise Road</b></p> <p>CITY <b>Seattle</b> STATE <b>WA</b></p> <p>ZIP CODE <b>12345</b> TELEPHONE (Include Area Code) <b>(555) 555-1234</b></p> <p>4 OTHER INSURED'S NAME (Last Name, First Name, Middle Initial)</p> <p>5 OTHER INSURED'S POLICY OR GROUP NUMBER</p> <p>6 OTHER INSURED'S DATE OF BIRTH MM YY <input type="checkbox"/> SEX <input type="checkbox"/> F <input type="checkbox"/> M</p> <p>7 EMPLOYER'S NAME OR SCHOOL NAME</p> <p>8 INSURANCE PLAN NAME OR PROGRAM NAME</p> </div> <div> <p>9 PATIENT'S BIRTH DATE <b>12 18 86</b></p> <p>10 PATIENT RELATIONSHIP <input checked="" type="checkbox"/> Spouse <input type="checkbox"/> Child <input type="checkbox"/> Other</p> <p>11 PATIENT STATUS <input checked="" type="checkbox"/> Single <input checked="" type="checkbox"/> Married <input type="checkbox"/> Divorced</p> <p>12 PATIENT'S CONDITION <input type="checkbox"/> Employed <input type="checkbox"/> Full-Time Student <input type="checkbox"/> Part-Time Student <input type="checkbox"/> Retired</p> <p>13 A CURRENTLY CURRENT <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>13 B AUTO ACCIDENT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>13 C OTHER ACCIDENT? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>13 D RESERVED FOR LOCAL USE</p> </div> </div>			
<p>14 READ BACK OF FORM BEFORE COMPLETING &amp; SIGNING THIS FORM</p> <p>15 PATIENTS OR AUTHORIZED PERSON'S SIGNATURE <b>Signature on File</b> DATE <b>02/11</b></p> <p>16 DATE OF CURRENT ILLNESS OR INJURY (MM YY) <b>02 05 06</b> DATE FIRST DATE <b>02 05 06</b></p> <p>17 NAME OF REFERRING PROVIDER OR OTHER SOURCE <b>K. Brown, MD</b></p> <p>18 RESERVED FOR LOCAL USE</p> <p>19 DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Please Items 1, 2, 3, 4 or 5 to Item 24E by Line)</p> <p>1. <b>L550 00</b> 3. _____</p>			
<div style="display: flex; justify-content: space-between;"> <div> <p>24 A DATES OF SERVICE FROM MM YY MM YY TO MM YY</p> <p>1 02 05 06 02 05 06 11 99212</p> <p>2 02 05 06 02 05 06 11 85610</p> <p>3 02 05 06 02 05 06 11 85635</p> </div> <div> <p>24 B C D PROCEDURES, SERVICES, OR SUPPLIES (Repeat Unusual Circumstances or MODIFIERS)</p> </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div> <p>25 FEDERAL TAX ID NUMBER <b>99-1234567</b> SSN EN <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>26 PATIENT'S ACCOUNT NO. <b>123456987</b></p> <p>27 ACCEPT ASSIGNMENT <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>28 SERVICE FACILITY LOCATION INFORMATION <b>Office Name 123 Main St. Seattle, WA 12345-2345</b></p> </div> <div> <p>29 TOTAL CHARGE <b>\$ 115 00</b></p> <p>30 AMOUNT PAID <b>\$ 115 00</b></p> <p>31 BILLING PROVIDER INFO &amp; P# <b>(555) 555-5555</b></p> <p>32 PROVIDER NAME <b>P.O. Box 12345 Seattle, WA 12345-2345</b></p> </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div> <p>33 SIGNATURE OF PHYSICIAN OR SUPPLIER <b>T. Jones</b></p> <p>34 DATE <b>02/14/06</b></p> </div> <div> <p>35 BALANCE DUE <b>\$ 115 00</b></p> </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div> <p>36 OTHER INFORMATION</p> </div> <div> <p>37 OTHER INFORMATION</p> </div> </div>			

**Diagnoses**  
**Procedures**  
**Charges**

# The Making of HCUP Data

Patient  
enters  
hospital



Billing  
record  
created



States store data  
in varying formats



Hospital sends  
billing data and any  
additional data elements  
to data organizations

744	98	749	2	79	257	5	290
745	25	814	4	84	541	4	549
746	66	195	1	76	469	3	522
747	43	726	3	46	231	4	970
748	81	533	6	98	83	8	40
749	51	418	4	69	496	1	813
750	16	574	2	77	575	1	995
751	2	326	4	44	638	2	958
752	63	521	4	18	237	8	721
753	38	887	4	44	446	2	71
754	50	418	0	59	226	4	799
755	22	806	3	46	573	2	994
756	94	745	6	55	247	1	218
757	36	852	8	8	289	3	159
758	43	186	1	94	418	1	611
759	17	786	8	92	799	5	612
760	14	735	3	29	556	6	503
761	5	263	4	76	175	8	997
762	48	109	3	94	484	8	206
763	23	916	6	35	556	9	327
764	11	251	4	37	175	6	192
765	30	976	1	9	562	6	39

AHRQ standardizes  
data to create  
uniform HCUP  
databases



# HCUP Databases

- Data from 49 States is used to create HCUP databases
- Uniform databases enable analyses across States, years, and settings of care
- One hospital encounter = one record in the HCUP databases
  - ▶ A person who has multiple hospital encounters in a single year will be included each time as a separate encounter record from the hospital
- Data contain clinical and resource use information included in a typical discharge abstract, with safeguards to protect the privacy of individual patients, physicians, and hospitals
- HCUP excludes information that could directly identify individuals

## What Kind of Research Does HCUP Support?

# Research Using the HCUP Databases



- To better understand the kind of research that HCUP supports, review HCUP-related resources:
  - ▶ HCUP Analytic Reports
    - Statistical Briefs
    - Findings-At-A-Glance Reports
  - ▶ HCUP Fast Stats
  - ▶ HCUP Visualizations
  - ▶ Peer-reviewed articles and report citations in the HCUP Publications Search

# Statistical Briefs on Specific Healthcare Topics

## **Hospital Inpatient**

- Hospitalization Overview
- Costs and Charges
- Hospital Characteristics

## **Emergency Department (ED)**

- ED Overview
- Costs and Charges
- Injuries

## **Quality of Care**

- Adverse Events/Patient Safety
- Preventable Hospitalizations

## **Medical Conditions**

- Cancer
- COVID-19
- Diabetes
- Infectious Disease
- Mental Health/Substance Use

## **Subgroup Focus Areas**

- Elderly
- Low Income
- Race and Ethnicity
- Urban/Rural

# Statistical Briefs Are Descriptive Reports on Specific Healthcare Topics

## Expected Payers and Patient Characteristics of Maternal Emergency Department Care, 2019

STATISTICAL BRIEF #296  
June 2022

Kimberly W. McDermott, Ph.D., Lawrence D. Reid, Ph.D., and  
Pamela L. Owens, Ph.D.

### Introduction

Maternal health coverage is an important element of health insurance coverage in the U.S. For example, under the Affordable Care Act pregnancy, maternal, and newborn care comprise essential health benefits that must be covered by all Marketplace plans.<sup>1</sup> Coverage of these services also has implications for access to and quality of care. One study found that pregnant women covered by Medicaid or with no insurance have higher rates of emergency department (ED) visits during pregnancy than pregnant women covered by private insurance.<sup>2</sup> As pregnancy-related complications were the fifth most common reason for ED visits for women aged 15–64 years in 2018,<sup>3</sup> information on ED use among pregnant women by expected payer provides useful information for analysts and policymakers and helps identify areas of focus for quality improvement efforts.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents statistics on treat-and-release ED visits (i.e., visits that result in discharge from the ED and do not result in admission to the same hospital) for pregnant women<sup>a</sup> aged 12–55 years using weighted estimates from the 2019 Nationwide Emergency Department Sample (NEDS). The distribution of ED visits and aggregate ED costs by primary expected payer is presented overall as well as by patient age group and race and ethnicity. Corresponding statistics for ED visits for nonpregnant women<sup>b</sup> aged 12–55 years are provided for comparison. Because of the large sample size of the NEDS data, small differences can be statistically significant. Thus, only differences greater than or equal to 10 percent are discussed in the text.

### Highlights

- Medicaid was the primary expected payer for more than half of treat-and-release emergency department (ED) visits and costs for pregnant women versus just over one-third of ED visits and costs for nonpregnant women aged 12–55 years.
- For pregnant women, the proportion of ED visits that were expected to be covered by Medicaid decreased with age, in contrast to the constant proportion of ED visits expected to be self-pay/no charge regardless of age.
- For pregnant women, the proportion of ED visits expected to be covered by Medicaid was highest for Hispanic women and Black non-Hispanic women.
- The proportion of ED visits that were expected to be self-pay/no charge was twice as high for Hispanic pregnant women as for White non-Hispanic pregnant women.
- Black non-Hispanic pregnant girls aged 12–17 years had the highest proportion of ED visits with an expected payer of Medicaid (79 percent vs. 69–71 percent for other pregnant girls in this age group).
- The percentage of ED visits for pregnant women expected to be self-pay/no charge was highest for Hispanic women aged 35–55 years (17 percent).

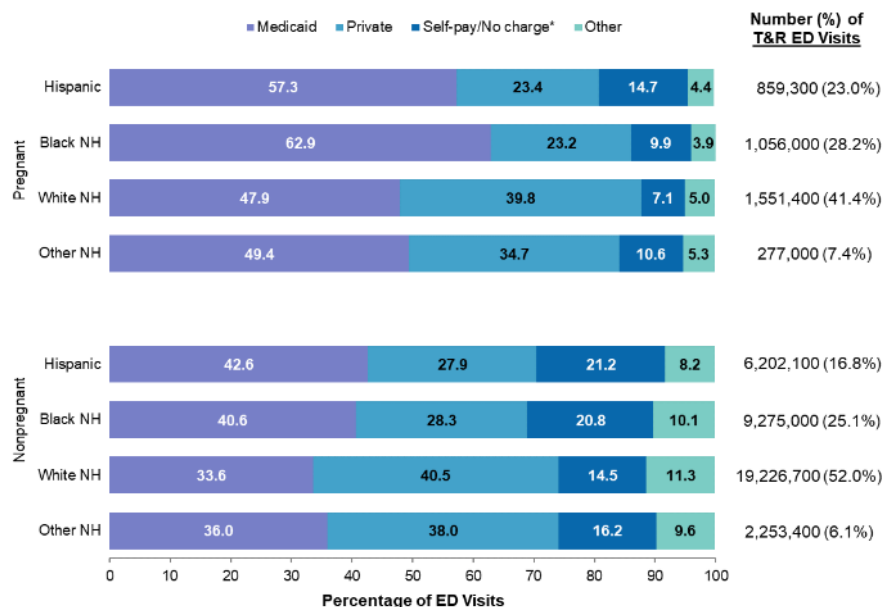
<sup>a</sup> ED visits for pregnant women were identified by the presence of a pregnancy-related diagnosis or procedure code on the record. Most ED visits for pregnant women (94.3 percent) were for a pregnancy-related condition; 5.7 percent of visits were for conditions unrelated to pregnancy.

<sup>b</sup> Given that this analysis relies on diagnosis and procedure codes documented on the ED record, some ED visits may have been misclassified as visits for nonpregnant women if a pregnancy was not recorded.

## Example figure from Statistical Brief #296: *Expected Payers and Patient Characteristics of Maternal Emergency Department Care, 2019*

Figure 3 presents the distribution of treat-and-release ED visits for pregnant women versus nonpregnant women by primary expected payer and patient race and ethnicity in 2019.

**Figure 3. Distribution of treat-and-release ED visits for pregnant and nonpregnant women aged 12–55 years, by primary expected payer and patient race and ethnicity, 2019**



Abbreviations: ED, emergency department; NH, non-Hispanic; T&R, treat-and-release

Notes: Number of treat-and-release ED visits is rounded to the nearest hundred. Percentages are based on unrounded estimates.

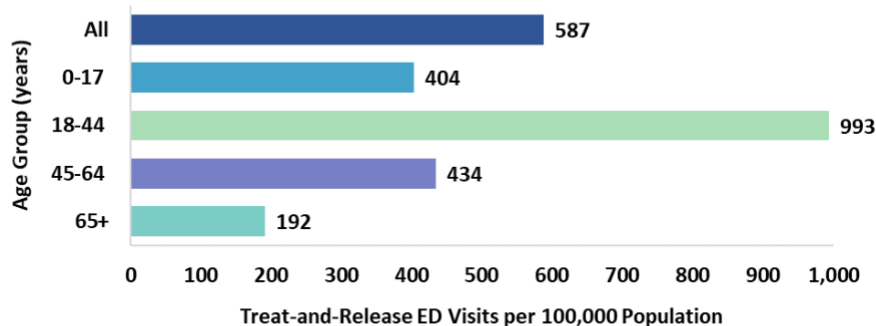
\* Self-pay/No charge: includes self-pay, no charge, charity, and no expected payment.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2019



# HCUP Findings-At-A-Glance Reports Available for Select Topics

**Figure 2. Rate per 100,000 population of treat-and-release emergency department visits for nontraumatic dental conditions by patient age group in the U.S., 2019**

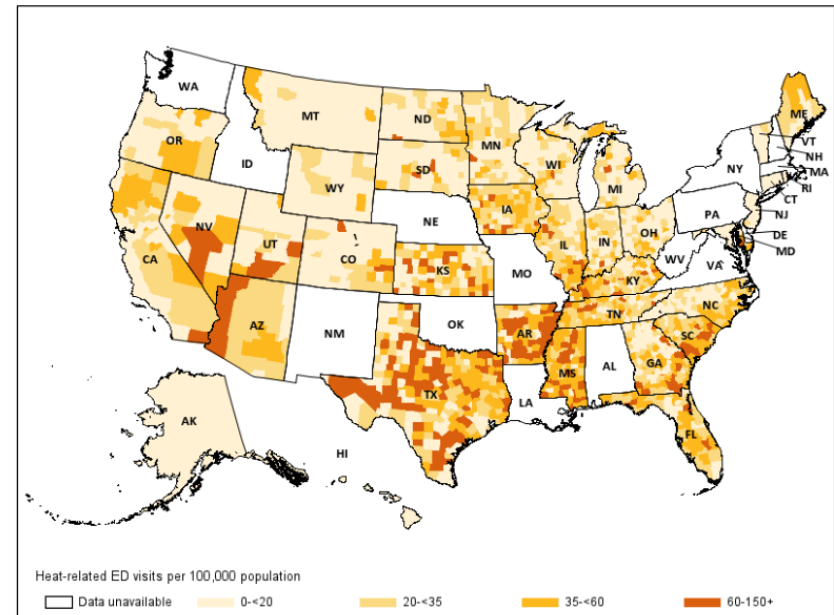


Abbreviation: ED, emergency department

Notes: ED visits for nontraumatic dental conditions were identified by the first-listed diagnosis. Patient age was rarely missing (0.004 percent) for ED visits for nontraumatic dental conditions in the U.S.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), Nationwide Emergency Department Sample (NEDS), 2019

**Figure 4. Emergency Department Visits with a Diagnosis Directly Indicating Heat Exposure per 100,000 Population, 2020**



Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Emergency Department Databases (SEDD) and State Inpatient Databases (SID), 2020

Abbreviation: ED, emergency department

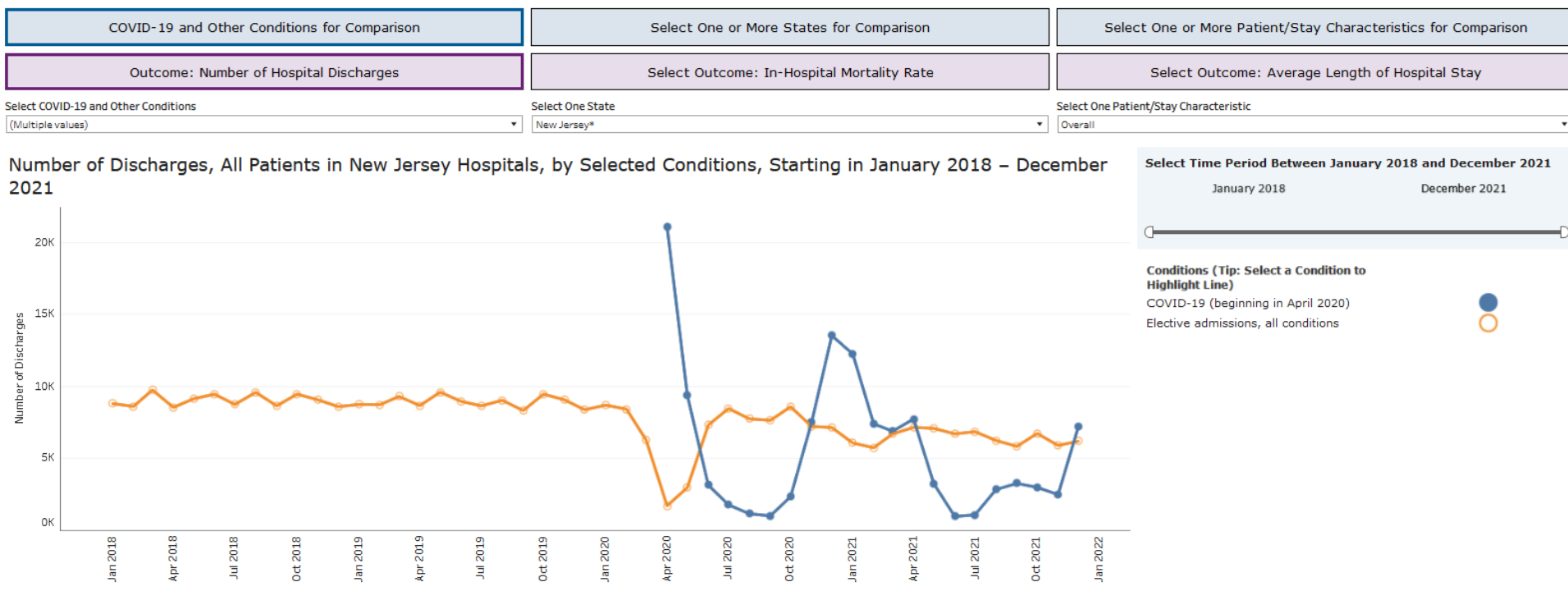
Notes: Quartiles for the population rates of ED visits with a diagnosis directly indicating heat exposure were derived using the 2,550 counties with at least one ED visit in the 2016–2019 SEDD and SID. Diagnoses directly indicating heat exposure include heat-related syncope, cramps, exhaustion, fatigue, and edema, in addition to effects of heat and light and exposure to excessive natural heat and sunlight.



# HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions



Interactive visual display of State-specific monthly trends in inpatient stays related to COVID-19 and other conditions

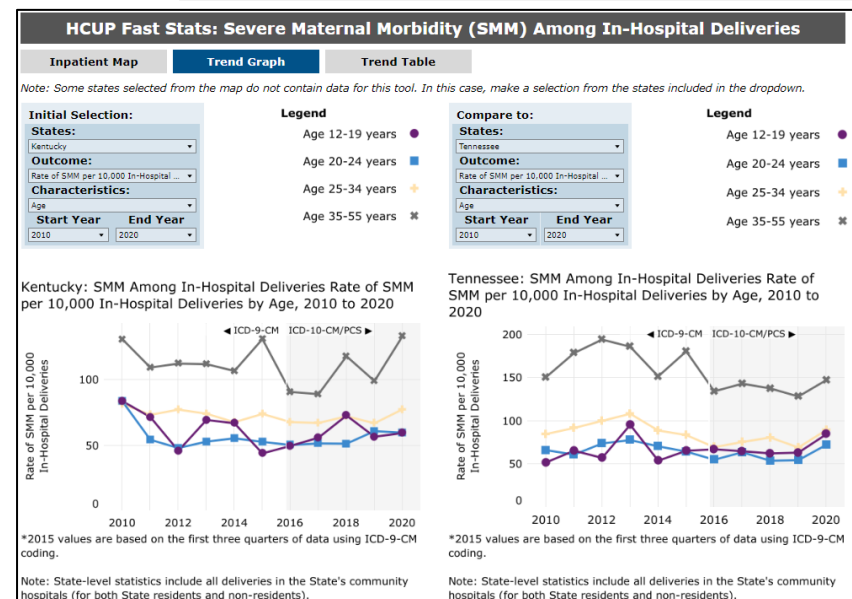
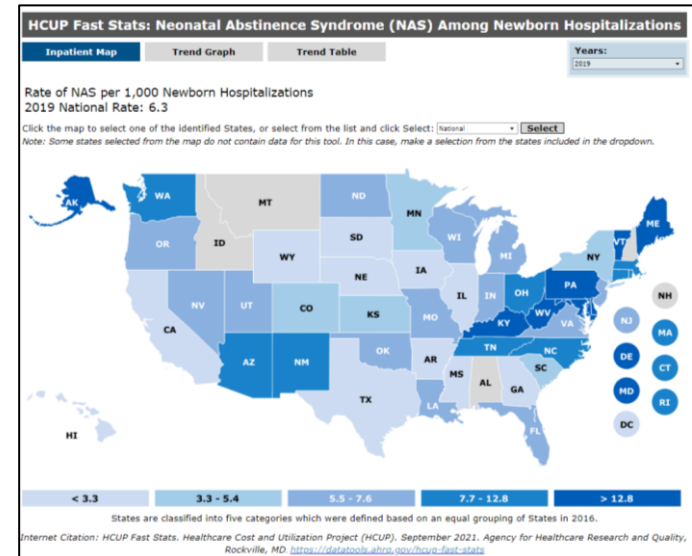


[www.hcup-us.ahrq.gov/datavisualizations/covid-19-inpatient-trends.jsp](http://www.hcup-us.ahrq.gov/datavisualizations/covid-19-inpatient-trends.jsp)

# HCUP Fast Stats Compares Statistics for Select Healthcare Topics

<https://datatools.ahrq.gov/hcup-fast-stats>

- Topics include:
  - ▶ Severe Maternal Morbidity
  - ▶ Neonatal Abstinence Syndrome
  - ▶ Opioid-Related Hospital Use
  - ▶ Hurricane Impact on Hospital Use
  - ▶ National Hospital Utilization and Costs
  - ▶ State Trends in Hospital Use by Payer



# Search for Publications Using HCUP Databases

An official website of the Department of Health & Human Services

AHRQ Agency for Healthcare Research and Quality

Search All AHRQ Websites | Careers

HEALTHCARE COST & UTILIZATION PROJECT

User Support

DO YOUR OWN ANALYSIS

EXPLORE EXPERT RESEARCH

DATABASE INFORMATION

RESEARCH TOOLS

REQUEST DATA

REPORTS & PUBLICATIONS

DATA VISUALIZATIONS

DATA QUERY TOOLS

**PUBLICATIONS SEARCH**

[HCUP Publications Search](#)

There are two options available to search for articles based on HCUP data or products.

**Simple Search:** Use the simple search feature available on this page. Select the publication category that you would like to search: Peer-Reviewed Journals, government publications. Enter the keyword(s) you would like to search in the text field. Select the search button. The simple search will search for the

**Advanced Search:** Use the [Advanced Search](#) feature to perform a more refined search. Access the Advanced Search feature by selecting one of the links including author, title, periodical, publication, abstract, state, HCUP data year, HCUP database, and HCUP tools and products.

To obtain a list of all articles based on HCUP data or products, select "All Publications" for the publication category and enter a single asterisk (\*) as the

**Simple Search**

Search  For

[Advanced Search](#)

**PUBLICATIONS ADVANCED SEARCH**

Advanced Search

Search

Limit Search By:

Fill in any or all of the fields below.  
All of these (AND) Any of these (OR)

Author

Title

Periodical

Publication Year

Abstract

State

HCUP Data Year

HCUP Database

HCUP Tools and Products (Choose one or multiple tools and products)

AHA Linkage Files  
Chronic Condition Indicator (CCI)  
Clinical Classifications Software (CCS) or Clinical Classifications Software Refined (CCSR)  
Cost-to-Charge Ratio Files (CCR)  
Elixhauser Comorbidity Software

Approximately  
11,080 peer-reviewed  
publications using  
HCUP data, products,  
or tools

## What Is Required When Using HCUP Data?

# Appropriate Use of HCUP Data



**The HCUP databases may be used for research, analysis, and aggregated statistical reporting**

- HCUP Data Use Agreement (DUA) training required to purchase data
- The DUA specifies that you will not use and will prohibit others from using the dataset:
  - For commercial or competitive purposes involving individual establishments
  - To determine the rights, benefits, or privileges of individual establishments
  - For criminal and civil litigation, including expert witness testimony
  - For law enforcement activities
  - For any other purpose incompatible with the AHRQ Confidentiality Statute and HCUP
  - To report, through any medium, data that could identify, directly or by inference, individual establishments
  - To use proprietary data elements for any commercial purpose without entering into a separate agreement with the appropriate organization or firm
  - To disassemble, decompile, or reverse-engineer the proprietary software

# Additional Requirements for HCUP State Databases



- If you plan to purchase State data, you must submit a Statement of Intended Use for review by AHRQ:
  - ▶ A description of the subject area and/or specific project
  - ▶ The goals and objectives of the project
  - ▶ The intended audience and anticipated final product(s)
  - ▶ Any specific reason for requesting the HCUP databases
- If the State data will subsequently be used for a new purpose, you must first submit a Data Re-Use Request for AHRQ's review

# Requirements of Publishing With HCUP Data



- Ensure the way that you plan to present your findings in disseminated materials (e.g., a journal article) aligns with the DUA's requirements for reporting:
  - ✓ Be sure to properly cite the database(s) and the specific State(s) used in the analysis (see HCUP Publishing Requirements: [www.hcup-us.ahrq.gov/db/publishing.jsp](http://www.hcup-us.ahrq.gov/db/publishing.jsp))
  - ✗ Do not report **discharge counts <11** in tables or text (applies to weighted or unweighted values)
  - ✗ Do not directly or indirectly identify hospitals
  - ✗ Do not post HCUP data on any website or publish them in any other publicly accessible online repository (and do not offer to share data on request in a data sharing statement)

# Consideration #1

## Deciding Which HCUP Database(s) to Use



# Consideration #1: Deciding Which HCUP Database(s) to Use



- Section Overview
  - ▶ What types of HCUP databases are available?
    - What inpatient HCUP databases are available?
    - What outpatient HCUP databases are available?
  - ▶ When are HCUP databases released?
  - ▶ Which HCUP database best suits your analysis?
  - ▶ Interested in purchasing an HCUP database?

# Consideration #1: Deciding Which HCUP Database(s) to Use



What Types of  
HCUP Databases  
Are Available?

# HCUP Databases Include Different Hospital Settings and Geographic Levels



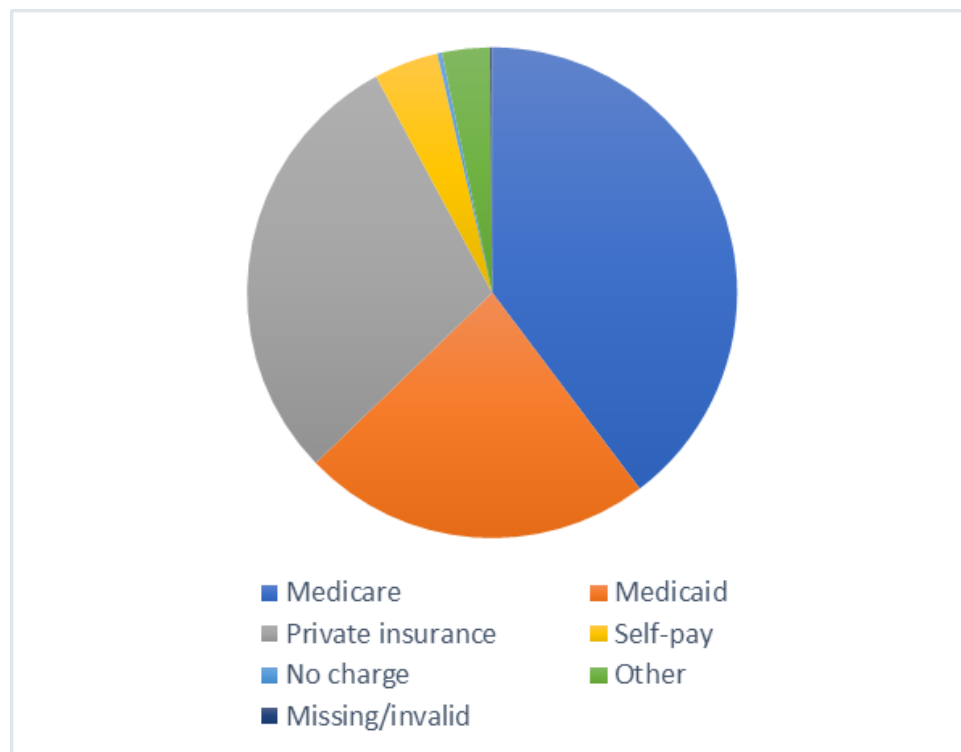
- Constant across all databases
  - ▶ Include all-payer data
  - ▶ Similar type of hospitals
- Different hospital settings
  - ▶ Inpatient databases
    - Discharge abstracts for patients admitted for an inpatient stay
  - ▶ Outpatient databases
    - Ambulatory surgery encounters
    - ED visits during which patients are treated and released from the ED
- Varying geographic levels
  - ▶ State
  - ▶ Nationwide

HCUP databases do not include physician office visits, pharmacy, and laboratory/radiology information

# What Does *All-Payer* Include?

Unlike many other data sources, HCUP includes **all-payer** data. This means that hospital encounters billed to:

- Medicare
- Medicaid
- Private insurance
- Self-pay
- Those billed as “no charge”
- Other (e.g., State and local programs, workers’ compensation)



Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2020

# HCUP Data Come Mostly From Community Hospitals



## American Hospital Association Definition:

Non-Federal, short-term general, and other special hospitals that are open to the public

Included*	Excluded
Multispecialty general hospitals	Non-Federal long-term care hospitals
OB-GYN	Psychiatric
Ear, nose, and throat	Alcoholism/chemical dependency facilities
Orthopedic	Long-term care rehabilitation
Pediatric	Department of Defense/Department of Veterans Affairs/Indian Health Service
Public	College infirmaries
Academic medical centers	Prison hospitals

\*Sometimes this also includes short-term rehabilitation and long-term acute care hospitals. Availability varies across HCUP States.

# Community Hospitals Provide a Range of Services

- HCUP generally does not receive data from noncommunity hospitals, such as psychiatric facilities
- However, if patients are treated for a mental health condition in a community hospital, their information is included

Mental, Behavioral, and Neurodevelopmental Disorders, Top Five Principal Diagnoses	Total Number of Discharges
1. Depressive disorders	426,705
2. Schizophrenia spectrum and other psychotic disorders	384,940
3. Alcohol-related disorders	326,890
4. Bipolar and related disorders	241,335
5. Suicidal ideation/attempt/intentional self-harm	103,290

Source: Weighted national estimates from the 2020 National Inpatient Sample (NIS), Clinical Classifications Software Refined (CCSR) default for principal diagnosis assignment, v2022.1.

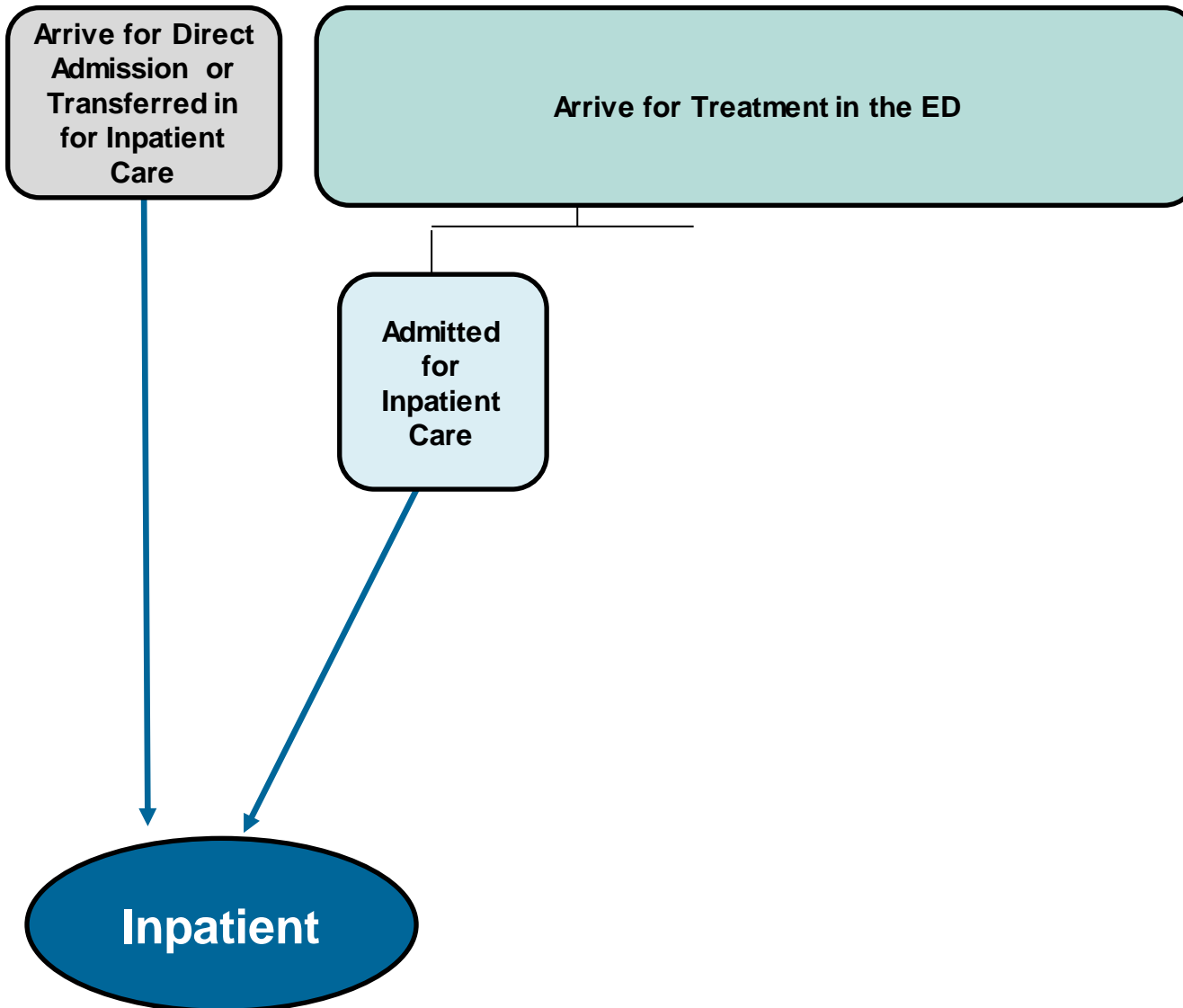
# Pathways of Care Reflected in HCUP Databases

Arrive for Direct  
Admission or  
Transferred in  
for Inpatient  
Care



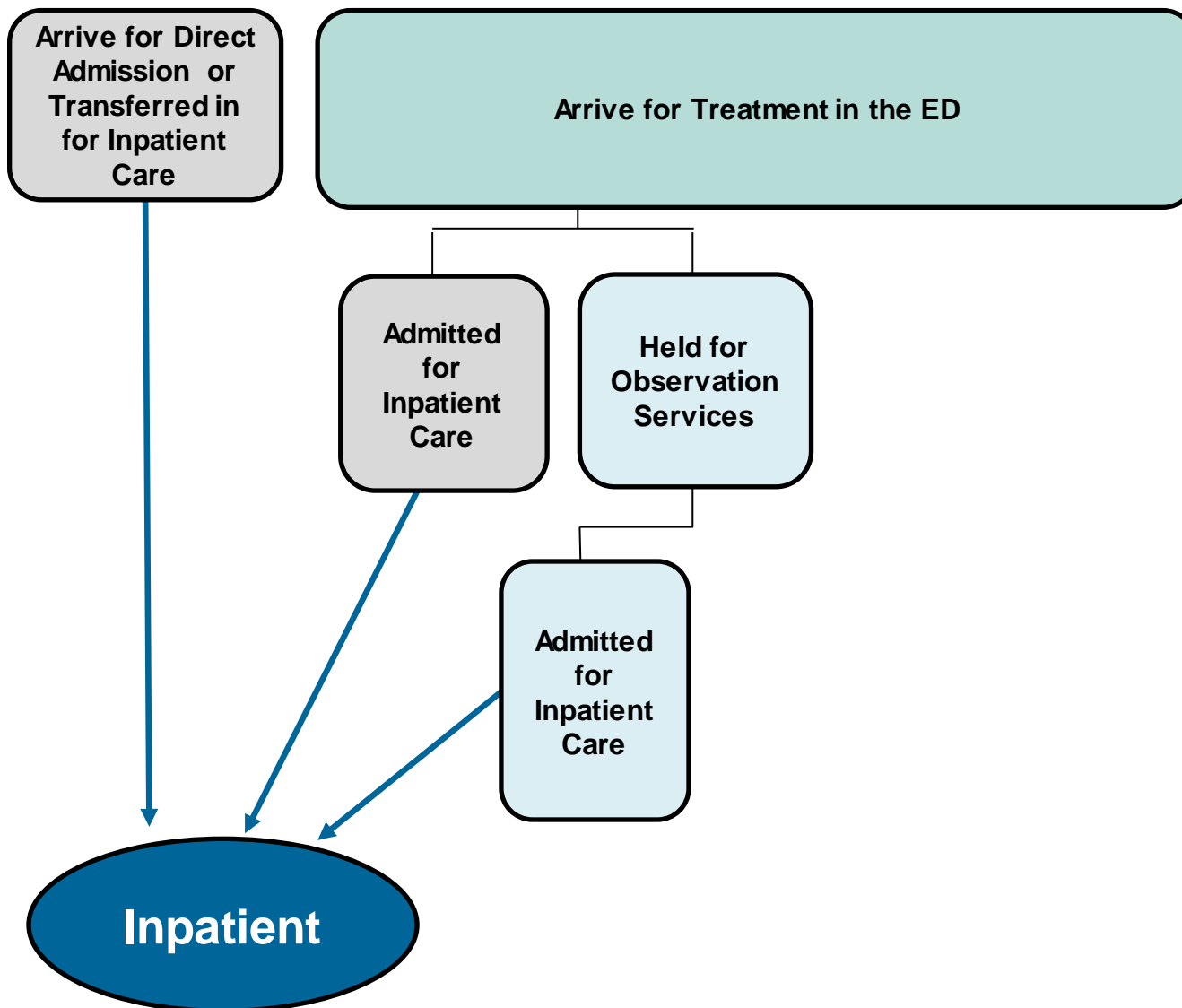
**Inpatient**

# Pathways of Care Reflected in HCUP Databases

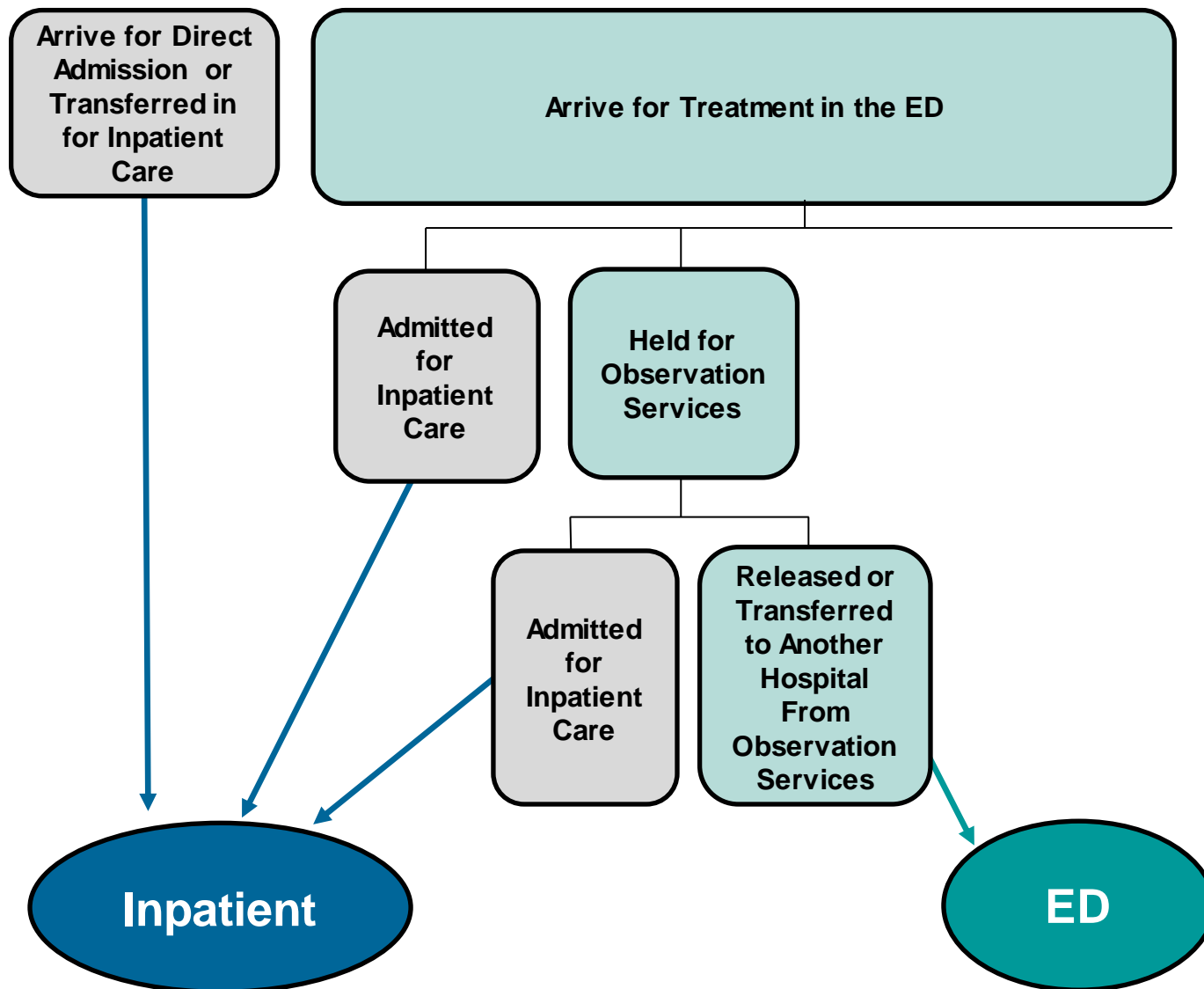




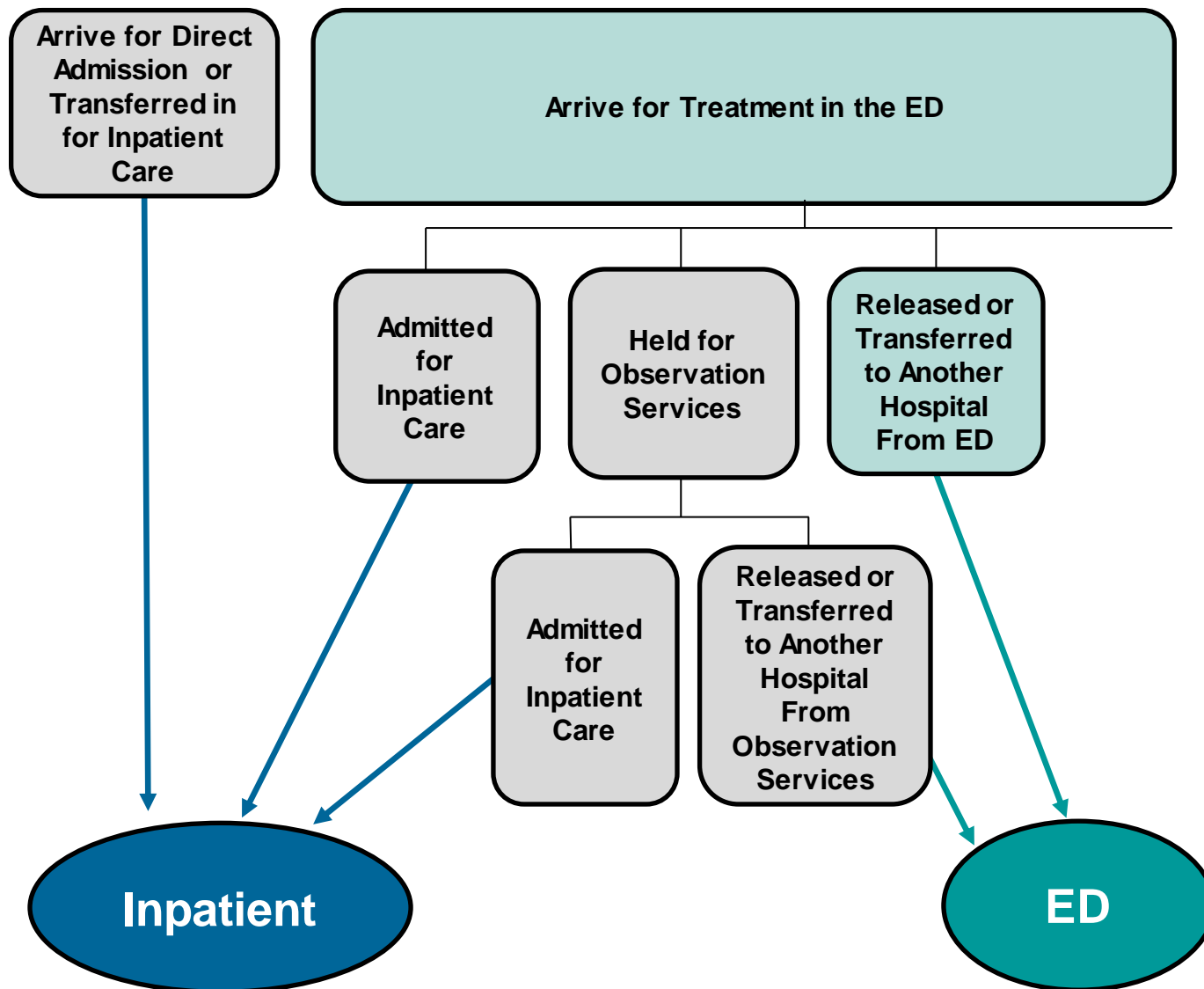
# Pathways of Care Reflected in HCUP Databases



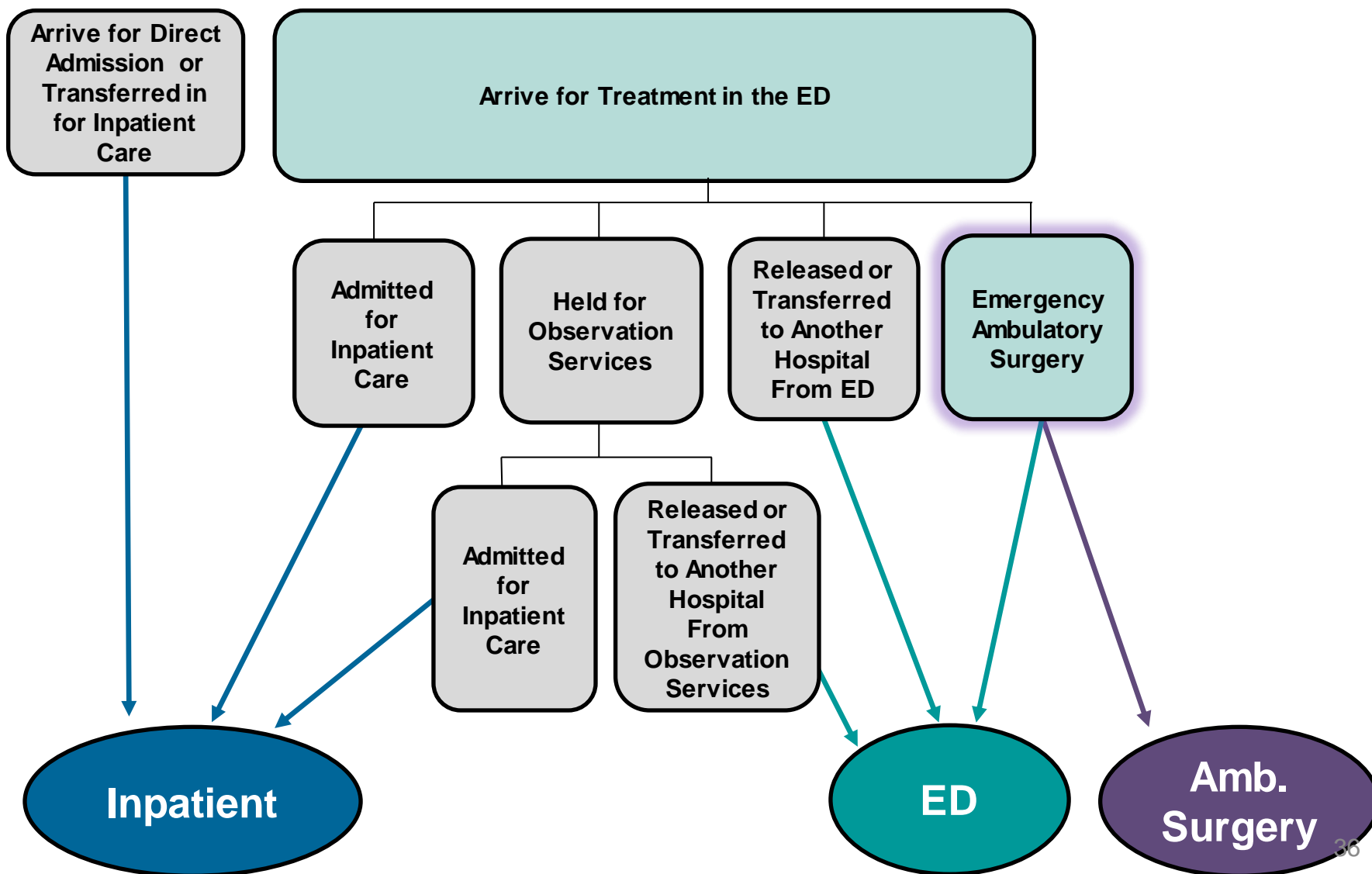
# Pathways of Care Reflected in HCUP Databases



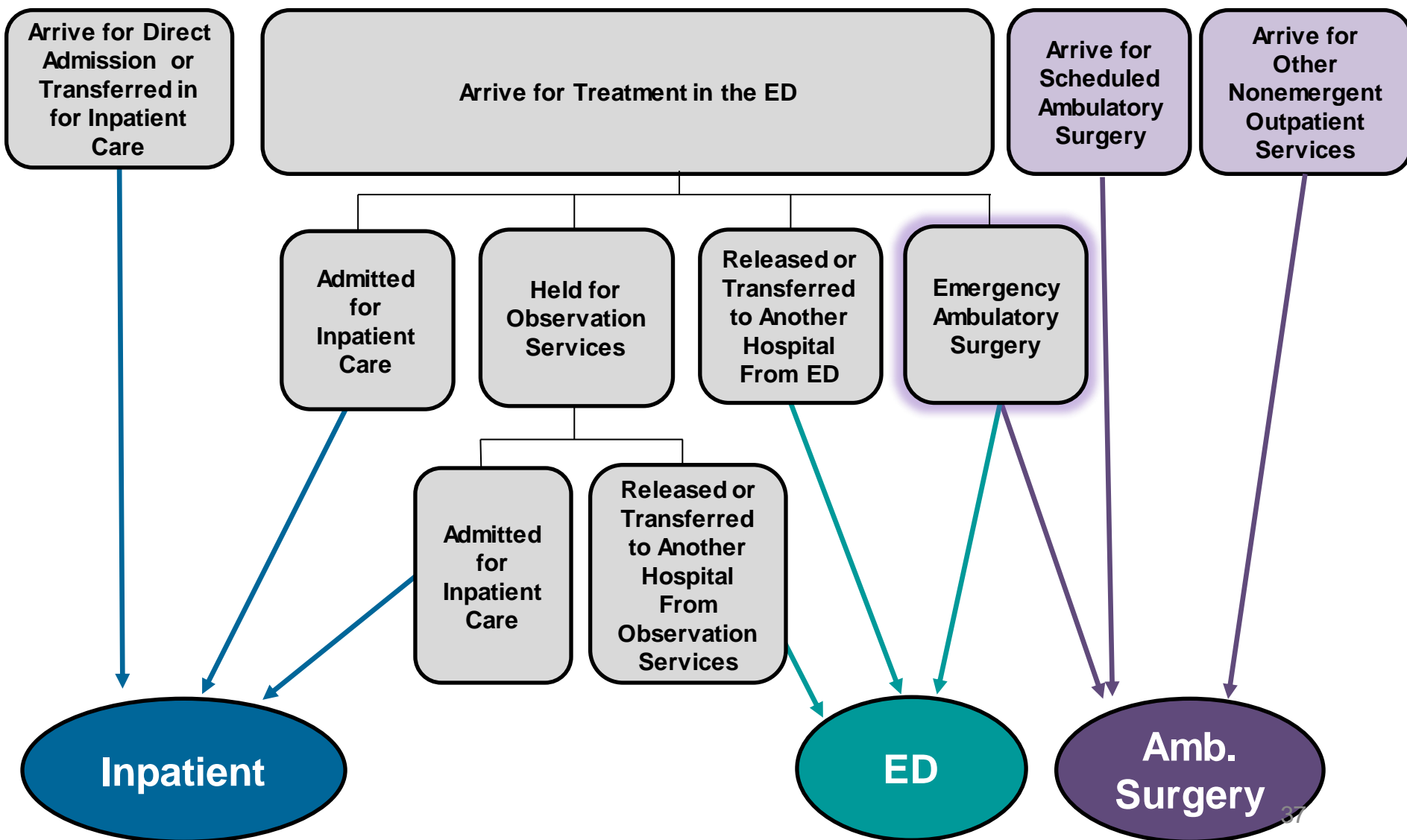
# Pathways of Care Reflected in HCUP Databases



# Pathways of Care Reflected in HCUP Databases



# Pathways of Care Reflected in HCUP Databases



# Consideration #1: Deciding Which HCUP Database(s) to Use

What Inpatient HCUP  
Databases Are  
Available?

# State Inpatient Databases (SID)

- The SID include all inpatient stays regardless of payer from most, if not all, hospitals in any given State
- In data year 2020, there are SID for 48 States and District of Columbia
  - ▶ Together, SID encompass about 97 percent of all U.S. hospital discharges
- 36 HCUP Partners make their HCUP SID available to the public for purchase through the HCUP Central Distributor



# SID Hospital and Discharge Counts

Comparison of Hospitals and Records in the 2019 HCUP State Inpatient Databases (SID) to the 2019 American Hospital Association (AHA) Survey of Hospitals								
State	AHA Counts for Community, Nonrehabilitation Hospitals <sup>1</sup>				AHA Counts for Admissions and Births <sup>2</sup>			
	Total number of hospitals (AHA ID) in the State <sup>6</sup>	Number of hospitals (AHA ID) included in the SID	Number of hospitals (AHA ID) not included in the SID	Percentage of total hospitals (AHA ID) that are not included in the SID	Total number of AHA admissions and births in the State	Number of AHA admissions and births for hospitals included in the SID <sup>3</sup>	Number of AHA admissions and births for hospitals not included in the SID	Percentage of total AHA admissions and births for hospitals that are not included in the SID
CA	349	345	4	1.1%	3,746,338	3,733,858	12,480	0.3%
CO	86	82	4	4.7%	496,901	495,489	1,412	0.3%
DC	9	7	2	22.2%	134,263	130,873	3,390	2.5%
DE	6	6	0	0.0%	112,565	112,565	0	0.0%
KS	133	117	16	12.0%	341,732	327,545	14,187	4.2%
MD	45	45	0	0.0%	596,984	596,984	0	0.0%
SC	66	58	8	12.1%	585,499	576,906	8,593	1.5%
SD	57	50	7	12.3%	120,196	114,494	5,702	4.7%
UT	51	51	0	0.0%	293,599	293,599	0	0.0%



# Restricted Release of Data

- States may restrict data release for some types of patients (e.g., HIV/AIDS)
  - ▶ Discharges may not be included in HCUP databases
  - ▶ Data values may be masked or perturbed for these discharges
- State-specific restrictions can be identified in the File Composition section under Database Documentation

# Restricted-Release Data Resources

- State databases: File Composition section under Database Documentation
  - ▶ [www.hcup-us.ahrq.gov/db/state/sid/sid\\_filecomp.jsp](http://www.hcup-us.ahrq.gov/db/state/sid/sid_filecomp.jsp)

## HCUP State Inpatient Databases (SID) File Composition

This section provides State-specific information on the original data files provided by the HCUP Partner organizations for the development of the HCUP inpatient databases. Information includes the source of the original data files, the types of hospitals included in those files, the records excluded during HCUP processing (if any), and other pertinent information to understand the composition of these files. For a description of the file composition for one or multiple States, check the corresponding boxes below and then click the "View File Composition" button.

### Overview of the SID

The SID are a set of all-payer inpatient databases from participating HCUP Partners that capture hospital inpatient stays in a given State. The SID include all or nearly all hospitalizations in participating States in a uniform format to facilitate multi-State comparisons and analyses. The SID contain a core set of clinical and nonclinical information on all patients, regardless of payer, including persons covered by Medicare, Medicaid, private insurance, and the uninsured.

Outpatient services, such as emergency department (ED) services or observation services (OS) can often occur in combination with an inpatient stay. Therefore, the SID may include records for inpatient stays that began in the ED or in observation. Inpatient records with evidence of ED services or OS can be identified using two separate HCUP variables — [HCUP\\_ED](#) and [HCUP\\_OS](#). The availability of information on inpatient stays involving ED services or OS varies substantially across States and data years as it is dependent on the SID including the necessary underlying data, such as revenue center codes.

The SID are calendar year files for all data years except 2015. Because of the transition to ICD-10-CM/PCS on October 1, 2015, the 2015 SID are split into two parts. Nine months of the 2015 data with ICD-9-CM codes (discharges from January 1, 2015 - September 30, 2015) are in one set of files labeled Q1Q3. Three months of 2015 data with ICD-10-CM/PCS codes (discharges from October 1, 2015 - December 31, 2015) are in a separate set of files labeled Q4. More information about the changes to the HCUP databases for ICD-10-CM/PCS and use of data across the two coding systems may be found on the [ICD-10-CM/PCS Resources page](#).

Check the corresponding boxes and then click

☐ [Arkansas](#)

☐ [Arizona](#)

☐ [California](#)

☐ [Maine](#)

☐ [Maryland](#)

☐ [New York](#)

☐ [North Carolina](#)

☐ [Oregon](#)

# National Inpatient Sample (NIS)

## Starting HCUP Database



The NIS is drawn from the SID, covering about 97 percent of the U.S. population

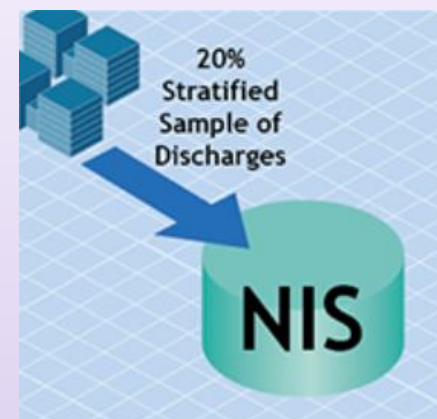
## Strata



- Hospital entity
- U.S. census division
- Ownership/control
- Urban/rural location
- Teaching status
- Bed size
- DRG
- Admission month

\*State **not** included

## Sample Design



The NIS is a **20 percent systematic random sample of discharges** from all community hospitals in the SID

# Kids' Inpatient Database (KID)

## Starting HCUP Database



The KID is drawn from **pediatric discharges** in the SID

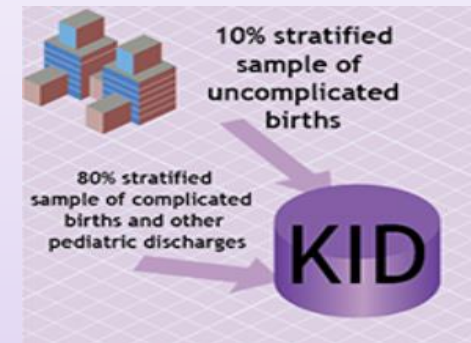
## Strata



- Uncomplicated births
- Complicated births
- Pediatric nonbirths

\*State **not** included

## Sample Design



The KID is a systematic random sample design, 10 percent **uncomplicated births** and 80 percent **complicated births and other pediatric discharges**

# Nationwide Readmissions Database (NRD)

## Starting HCUP Database



The NRD is drawn from SID that have **verified patient linkage numbers**

## Strata



- U.S. region
- Urban/rural location
- Teaching status
- Size
- Ownership/control
- Patient age and sex

\*State **not** included

## Sample Design



The NRD is a **100 percent sample of discharges from the SID**, after certain discharge and hospital exclusions

# Consideration #1: Deciding Which HCUP Database(s) to Use

What Outpatient  
HCUP Databases Are  
Available?



# State Ambulatory Surgery and Services Databases (SASD)

- The SASD include encounters for ambulatory surgery and other outpatient services regardless of payer from most, if not all, hospital-owned facilities in any given State
  - ▶ Some SASD include encounters from nonhospital-owned facilities
- In data year 2019, there are SASD for 34 States and District of Columbia
- 26 HCUP Partners make their HCUP SASD available to the public for purchase through the HCUP Central Distributor



# Content of SASD Varies Across States



- The SASD include encounter-level data for ambulatory surgeries and may also include other types of outpatient services, such as observation stays, hospital outpatient clinic visits, lithotripsy, imaging, and chemotherapy
  - ▶ Also includes combination ED and ambulatory surgery records
- The File Composition section details the types of data provided by the HCUP Partner

SASD File Composition section available on the HCUP-US website at [www.hcup-us.ahrq.gov/db/state/sasddist/sasd\\_multi.jsp](http://www.hcup-us.ahrq.gov/db/state/sasddist/sasd_multi.jsp)



# Examples of SASD Content

Facility/Data Type	California	Colorado	Florida
<b>Types of facilities</b>			
Hospital-owned facilities			
Ambulatory surgery	X	X	X
Other outpatient			X
Nonhospital-owned facilities			
Ambulatory surgery	X		X
Other outpatient			X
<b>Types of outpatient data</b>			
Ambulatory surgery	X	X	X
Lab, diagnostic radiology, imaging			X
Lithotripsy			X
Cardiac catheterization			X

# State Emergency Department Databases (SEDD)

- The SEDD include ED visits regardless of payer from most, if not all, hospital-owned EDs in any given State
  - ▶ SEDD include encounters in which the patient:
    - Was treated in the ED and then released from the ED
    - Was transferred to another hospital or health facility
    - Left against medical advice
    - Died while receiving ED care
- In data year 2019, there are SEDD for 40 States and District of Columbia
- 30 HCUP Partners make their HCUP SEDD available for purchase through the HCUP Central Distributor



The SID include data for ED visits that result in an admission to the same hospital

# Content of SEDD Varies Across States



- ED encounters might also involve observation services (OS)
  - ▶ Identified by data element HCUP\_OS > 0
- ED encounters that include both ED services and ambulatory surgery are in the SEDD
  - ▶ Starting data year 2021, data element SASD\_SEDD indicates whether a record for the encounter is in both the SASD and SEDD
- The File Composition section details the types of data provided by the HCUP Partner

SEDD File Composition section available on the HCUP-US website at [www.hcup-us.ahrq.gov/db/state/sedddist/sedd\\_multi.jsp](http://www.hcup-us.ahrq.gov/db/state/sedddist/sedd_multi.jsp)

# Nationwide Ambulatory Surgery Sample (NASS)

## Starting HCUP Database



The NASS is drawn from SASD encounters with **in-scope ambulatory surgeries**.

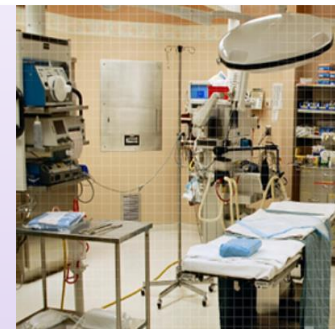
## Strata



- U.S. region
- Bed size
- Urban/rural location
- Teaching status
- Ownership/control

\*State **not** included

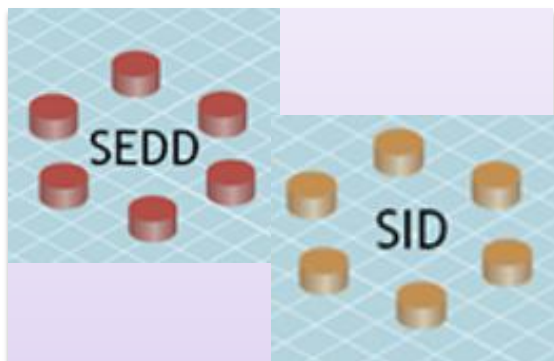
## Sample Design



The NASS is a 100 percent sample of **in-scope ambulatory surgery encounters** from hospital-owned facilities in the SASD.

# Nationwide Emergency Department Sample (NEDS)

## Starting HCUP Database



The NEDS is drawn from **SEDD** (ED treat-and-release visits) and **SID** (ED visits resulting in a hospital stay).

## Strata



- U.S. region
- Urban/rural location
- Teaching status
- Ownership/control
- Trauma center

\*State **not** included

## Sample Design



The NEDS is a 20 percent **stratified sample of hospital-owned EDs** from the SID and SEDD. Roughly 85 percent of ED visits are treat-and-release, and 15 percent result in a hospital stay.

# Comparison of the HCUP Inpatient Databases

## HCUP Inpatient Databases

HCUP database	SID	NIS	KID	NRD
<b>States</b>	48 States + DC	48 States + DC	48 States + DC	30 States
<b>Hospitals</b>	4,500	4,500	4,000	2,500
<b>Inpatient discharges</b>	34 million	7 million	3 million	18 million
<b>Derived from</b>	--	SID	SID	SID
<b>Uses</b>	Examine State and local market area statistics on healthcare utilization, access, quality, patient safety, etc. Readmission analyses possible in some States.	Generate national and regional estimates of healthcare utilization, access, quality, patient safety, etc.	Generate national and regional <u>pediatric</u> estimates of healthcare statistics.	Generate national estimates of all-cause and condition-specific readmissions.

# Comparison of the HCUP Outpatient Databases

	Emergency Department Data		Ambulatory Surgery and Services Data	
HCUP database	SEDD	NEDS	SASD	NASS
States	40 States + DC	40 States + DC	34 States + DC	34 States + DC
Hospitals	3,600	1,000	3,400	3,000
Outpatient records	103 million ED visits	33 million ED visits	19 million ambulatory surgery encounters	9 million in-scope ambulatory surgery encounters
Derived from	–	SID and SEDD	–	SASD
Uses	Examine ED visits at hospital- affiliated EDs that do not result in an admission for a given State.	Generate national and regional estimates for hospital-owned ED visits.	Study encounter- level data for ambulatory surgeries and other outpatient services from hospital- owned facilities.	Generate national and regional estimates of in-scope ambulatory surgery encounters performed in hospital- owned facilities.

# Consideration #1: Deciding Which HCUP Database(s) to Use

When Are  
HCUP Databases  
Released?



# Timing of Database Releases

- HCUP State-level databases:
  - ▶ Rolling basis, typically 6–9 months following the end of a calendar year
  - ▶ Select 2021 State databases now available
- HCUP nationwide databases:
  - ▶ Annually, typically 18–22 months following the end of a calendar year
    - KID available every 3 years (latest is 2019)
  - ▶ 2020 nationwide databases released this year



# Consideration #1: Deciding Which HCUP Database(s) to Use

Which HCUP  
Database Best Suits  
Your Analysis?

# Database Decision Making

- Choice of HCUP database(s) depends on:
  - ▶ Setting of care
  - ▶ Geographic area of interest
  - ▶ Outcomes of interest
  - ▶ Conditions and/or procedures of interest
  - ▶ Availability of necessary data elements
  - ▶ Required population size
- Let's consider some example research questions ...

# Which HCUP Inpatient Database(s) Best Supports the Research Question?



How do inpatient stays related to asthma differ for patients who reside in urban and rural areas?

SID

NIS

KID

NRD

# Which HCUP Inpatient Database(s) Best Supports the Research Question?



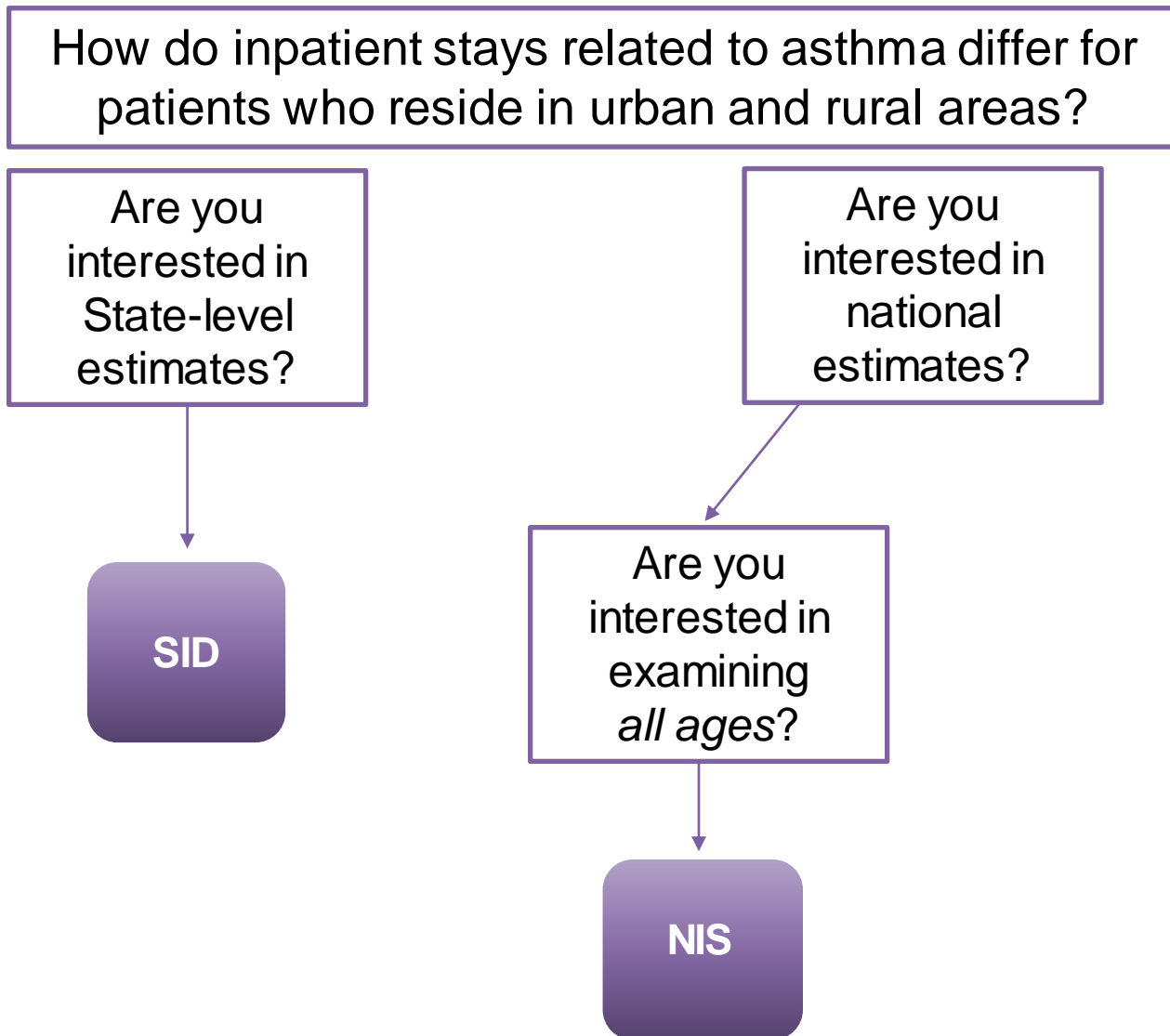
How do inpatient stays related to asthma differ for patients who reside in urban and rural areas?

Are you  
interested in  
State-level  
estimates?

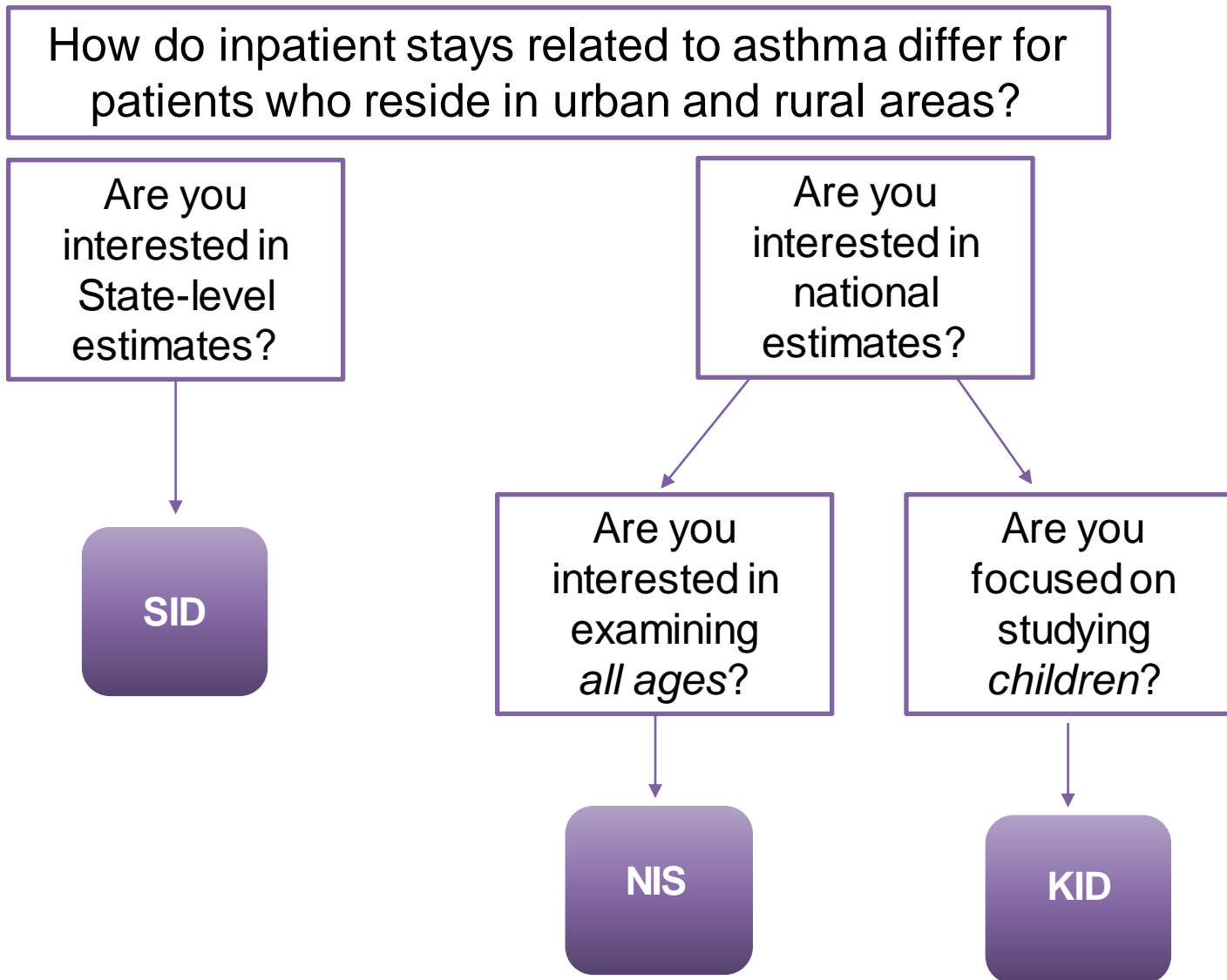


**SID**

# Which HCUP Inpatient Database(s) Best Supports the Research Question?



# Which HCUP Inpatient Database(s) Best Supports the Research Question?



# Which HCUP Inpatient Database(s) Best Supports the Research Question?



Are 30-day readmission rates for inpatient stays with at least one diagnosis indicating a chronic condition longer than stays for patients with no chronic conditions?

SID

NIS

KID

NRD



# Which HCUP Inpatient Database(s) Best Supports the Research Question?

Are 30-day readmission rates for inpatient stays with at least one diagnosis indicating a chronic condition longer than stays for patients with no chronic conditions?

State-level  
estimates?

SID\*

National  
estimates?

NRD

\*Only some SID have patient linkage numbers (HCUP data element VisitLink) that are needed for readmission analyses.

# Which HCUP Inpatient Database(s) Best Supports the Research Question?



How do food insecurity and lack of green space affect hospitalizations for acute myocardial infarction in Arizona counties?

SID

NIS

KID

NRD

# Which HCUP Inpatient Database(s) Best Supports the Research Question?



How do food insecurity\* and lack of green space\* affect hospitalizations for acute myocardial infarction in Arizona counties?

SID

\*This specific information will come from an external data source because it is unavailable in the HCUP databases.



# Which HCUP Outpatient Database(s) Best Supports the Research Question?

What types of treat-and-release ED visits include peripheral vascular disease reported as a comorbidity?

SEDD

SASD

NEDS

NASS

# Which HCUP Outpatient Database(s) Best Supports the Research Question?

What types of treat-and-release ED visits include peripheral vascular disease reported as a comorbidity?

Are you  
interested in  
State-level  
estimates?

SEDD

Are you  
interested in  
national  
estimates?

NEDS\*

\*The NEDS will need to be limited to ED treat-and-release visits using the NEDS data element HCUPFILE.



# Which HCUP Outpatient Database(s) Best Supports the Research Question?

What is the number of ambulatory surgeries for heart valve procedures?

**SEDD**

**SASD**

**NEDS**

**NASS**

# Which HCUP Outpatient Database(s) Best Supports the Research Question?



What is the number of ambulatory surgeries for heart valve procedures?

Are you  
interested in  
State-level  
estimates?

**SASD**

Are you interested  
in national or  
regional  
estimates?

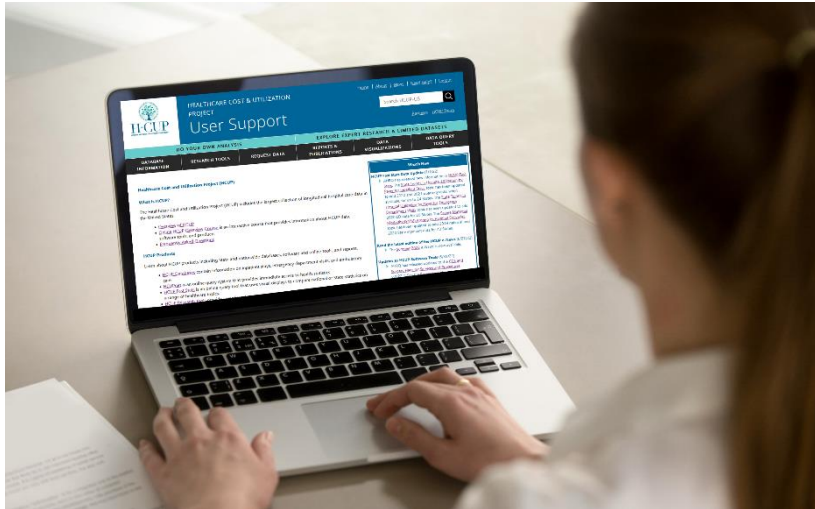
**NASS**

# Consideration #1: Deciding Which HCUP Database(s) to Use

Interested in  
Purchasing an  
HCUP Database?



# HCUP Databases Available Through HCUP Central Distributor



- ▶ The HCUP Central Distributor provides one-stop shopping for purchasing State and nationwide databases
- ▶ Cost and availability of databases vary across years
- ▶ Some Partner organizations may place additional restrictions on the sale of their State data

**HCUP Central Distributor website:**

[www.hcup-](http://www.hcup-)

[us.ahrq.gov/tech\\_assist/centdist.jsp](http://us.ahrq.gov/tech_assist/centdist.jsp)

# Pricing Varies by Database, Year, and User Affiliation

## Nationwide databases (NIS, KID, NASS, NEDS, NRD)

- ▶ **NIS**: \$750 beginning 2017, student price \$150
- ▶ **KID**: \$500 beginning 2016, student price \$100
- ▶ **NASS**: \$1,000 beginning 2016, student price \$200
- ▶ **NEDS**: \$1,000 beginning 2016, student price \$200
- ▶ **NRD**: \$1,000 beginning 2015, student price \$200

## State databases (SID, SASD, SEDD)

- ▶ Varies by State, database, year, and type of applicant
- ▶ \$50–\$3,200



**Some 2021 State  
databases now  
available!**

# Questions or Comments?



# Workshop Agenda: Day 1



Topic	Duration	Start Time (PST/EST)
Brief Overview of HCUP	20 min	9:00 a.m./12:00 p.m.
Consideration #1: Deciding Which HCUP Database to Use	40 min	9:20 a.m./12:20 p.m.
Q&A	10 min	10:00 a.m./1:00 p.m.
<i>Break</i>	10 min	10:10 a.m./1:10 p.m.
<b>Consideration #2: Using Multi-Year HCUP Data for Your Analysis</b>	15 min	10:20 a.m./1:20 p.m.
Consideration #3: Defining Your Conditions and/or Procedures of Interest	60 min	10:35 p.m./1:35 p.m.
Brief Overview of HCUP-US Website Resources	10 min	11:35 p.m./2:35 p.m.
Q&A	15 min	11:45 p.m./2:45 p.m.

# Consideration #2

## Using Multi-Year HCUP Data for Your Analysis

# Consideration #2: Using Multi-Year HCUP Data for Analysis



- Section Overview
  - ▶ What HCUP database changes affect trends?

# Consideration #2: Using Multi-Year HCUP Data for Your Analysis



What HCUP Database  
Changes Affect  
Trends?

# Be Mindful of Database Changes



- Design changes to the HCUP nationwide databases
  - ▶ NIS in 1998 and 2012
  - ▶ KID in 2000
  - ▶ NASS in data years 2016–2019
- Transition from ICD-9-CM\* to ICD-10-CM/PCS\* diagnosis and procedure coding on October 1, 2015
  - ▶ File structure changes for all HCUP databases
  - ▶ Discontinuity in trends for certain conditions and procedures
- These changes are important to factor into analyses spanning multiple years

\* ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification. ICD-10-CM/PCS is the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System.



# NIS/KID Trend Weight Files Adjust Discharge Weights for Longitudinal Analyses



- Need to account for changes in the sample design when doing longitudinal analyses that span redesign time periods
- **NIS**
  - ▶ Starting in 2012, the NIS is a 20 percent *sample of discharges* from all hospitals in the SID
  - ▶ For prior years, the NIS was a 20 percent *sample of hospitals* in the SID
    - In 1998, community hospitals that were considered rehabilitation facilities were excluded and the identification of teaching hospital was revised
- **KID**
  - ▶ Starting in 2000, pediatric discharges were defined as having an age at admission of 20 or less and rehabilitation facilities were excluded
  - ▶ Prior to 2000, pediatric discharges were defined as having an age of 18 or less
- Trend weight files are available that account for sample redesign of the NIS (1998, 2012) and KID (2000) when trending across these years

[www.hcup-us.ahrq.gov/db/nation/nis/trendwghts.jsp](http://www.hcup-us.ahrq.gov/db/nation/nis/trendwghts.jsp)

[www.hcup-us.ahrq.gov/db/nation/kid/kidtrends.jsp](http://www.hcup-us.ahrq.gov/db/nation/kid/kidtrends.jsp)

# NASS Sampling Design Changes





- The NASS has undergone several design changes:
  - ▶ Procedures considered in scope for the NASS sample can change year to year
  - ▶ Earlier years of the NASS (2016–2018) undercount certain emergent surgeries
  - ▶ Hospital-owned facility universe was modified starting in 2019 to include specialty hospitals and limit to hospitals included in the AHA Annual Survey that reported performing outpatient surgery
- Changes may affect trends for certain analyses
- No special trend weights are necessary

Additional information on these changes is available on HCUP-US in [Section 4.8 of the NASS Introduction](#)

# Transition From ICD-9-CM to ICD-10-CM/PCS on October 1, 2015

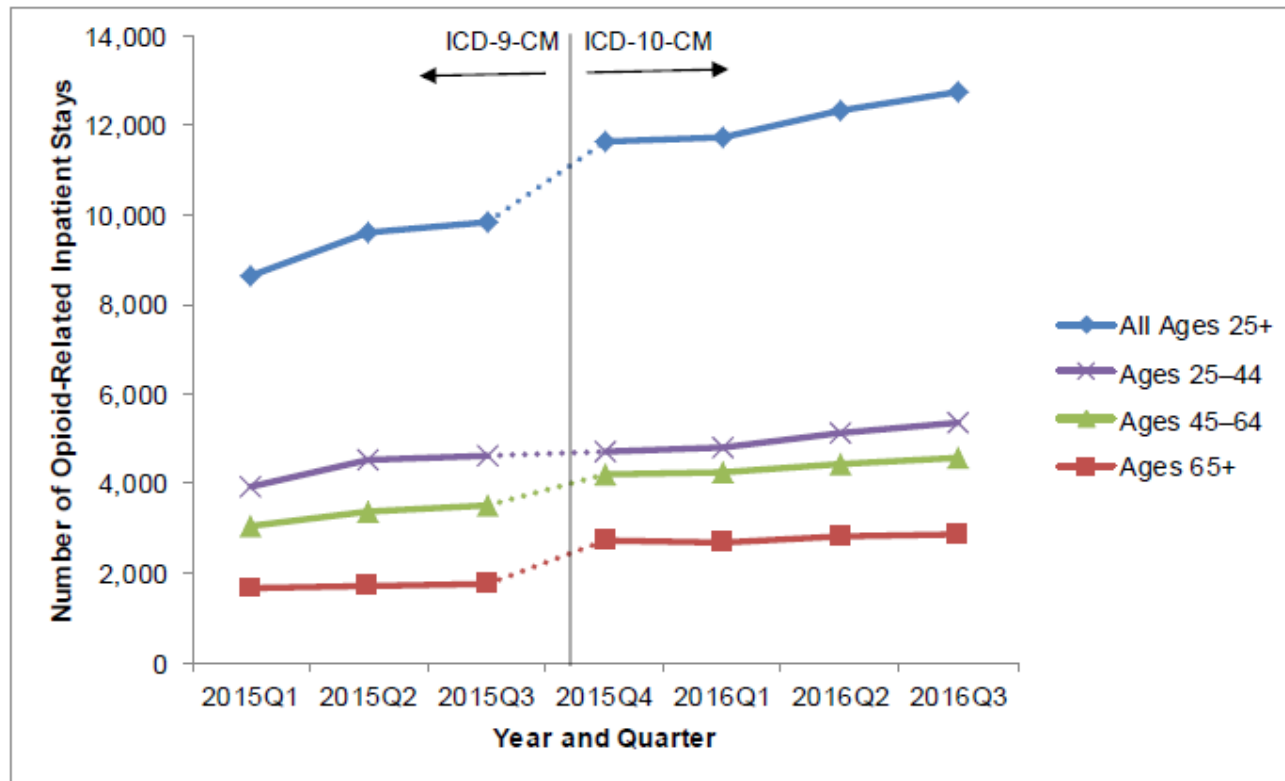


- Transition has a direct impact on the reporting of medical services and health services research
- Greater specificity in ICD-10-CM/PCS
  - ▶ Number of diagnosis codes increased
    - About 14,000 (ICD-9-CM)  Over 70,000 (ICD-10-CM)
  - ▶ Number of procedure codes increased
    - About 4,000 (ICD-9-CM)  Over 80,000 (ICD-10-PCS)
- Impacts multi-year analysis of HCUP data
  - ▶ Noticeable changes in trends for certain diagnoses and procedures
  - ▶ HCUP file structure and data element names

# Be Mindful of Transition's Impact on Diagnosis and Procedure Coding

Users should examine the extent to which the transition causes a discontinuity in trends for diagnoses/procedures

Figure 1. Number of Opioid-Related Inpatient Stays by Age, 2015 Q1 Through 2016 Q3



Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, State Inpatient Databases for 2015 and quarterly inpatient data for 2016 from three States (Colorado, Kentucky, and Minnesota).

# Impact of ICD-9-CM to ICD-10-CM/PCS Transition on HCUP Databases



- Changes to the HCUP Database that highlight the change in coding systems include:
  - ▶ File structure of HCUP Databases
    - Prior to 2015: all data in annual files
    - 2015:
      - Data for January-September with ICD-9-CM in one set of files
      - Data for October-December with ICD-10-CM/PCS in a separate set of files
    - Starting in 2016: all data in annual files
  - ▶ Data element names
    - Added prefix “I10\_” to names of most diagnosis- and procedure-related data elements
  - ▶ Availability of data elements derived from ICD-10-CM/PCS vary by year

# Consideration #3

Defining Condition(s) or  
Procedure(s) of Interest

# Consideration #3: Defining Condition(s) or Procedure(s) of Interest



- Section Overview
  - ▶ What coding systems and classification schemes are included on the HCUP databases?
  - ▶ What HCUP software tools provide a means of classifying diagnoses and procedures?
  - ▶ What HCUP software tools help identify surgical procedures?
  - ▶ Which diagnosis or procedure classification is best?
  - ▶ Are there enough cases to support your analysis?

# Consideration #3: Defining Condition(s) or Procedure(s) of Interest



What Coding Systems  
and Classification  
Schemes Are Included  
on the HCUP  
Databases?



# Coding Systems Based on Setting of Care

- The following are industry-standard systems for assigning codes to diagnoses, procedures, or services
- Consider which coding system is appropriate for your analysis

## Diagnosis Related

ICD-10-CM  
ICD-9-CM

## Procedure Related

ICD-10-PCS  
HCPCS\* Level I (CPT®\*)  
HCPCS Level II  
ICD-9-CM

\* HCPCS is the Healthcare Common Procedure Coding System. CPT is Current Procedural Terminology.

# ICD-9-CM Codes

- Valid for data through September 30, 2015
- Designed for the reporting of *inpatient and outpatient* diagnoses and procedures
- Over 14,000 diagnosis codes and 3,900 procedure codes

# ICD-10-CM/PCS Codes



- Valid as of October 1, 2015
  - ▶ ICD-10-CM: Designed for the reporting of *inpatient and outpatient* diagnoses
  - ▶ ICD-10-PCS: Designed for the reporting of *inpatient* procedures
- Greater specificity in the ICD-10-CM/PCS coding system compared with ICD-9-CM
  - ▶ Over 70,000 diagnosis codes and 80,000 procedure codes
  - ▶ Multiple ICD-10-PCS procedure codes are often required to identify a single surgery

# CPT and HCPCS Level II Codes



- Valid for all data years
- Designed for the reporting of *outpatient* procedures and services
- HCPCS Level I codes (known as CPT codes)
  - ▶ Used to report physician evaluation and management services and outpatient procedures (e.g., diagnostic and therapeutic surgical and nonsurgical procedures, radiological procedures, and laboratory tests)
- HCPCS Level II codes
  - ▶ Used to report items such as devices, durable medical equipment, prosthetics, orthotics, ancillary surgical supplies, nonphysician services, and healthcare supplies
  - ▶ Some SASD do not include HCPCS Level II codes

# Availability of Certain Classification Schemes in Inpatient Setting



- Three classification schemes are available for inpatient setting
  - ▶ Medicare Severity Diagnosis Related Group (MS-DRG)
    - Categorize patients into clinically coherent and homogeneous groups with respect to resource use according to diagnosis, procedures, age, and discharge status
  - ▶ Major Diagnostic Category (MDC)
    - Broad groups of MS-DRGs that relate to an organ or a system and not to an etiology
  - ▶ All Patient Refined DRGs (APR-DRGs )
    - Available only for the NIS, KID, and NRD
    - Similar to the MS-DRGs, but designed by 3M™ Health Information Systems to account for all patients and severity of illness

# Consideration #3: Defining Condition(s) or Procedure(s) of Interest



What HCUP Software  
Tools Provide a  
Means of Classifying  
Diagnoses and  
Procedures?

# HCUP Software Tools for Classifying Diagnosis and Procedure Codes



## **ICD-9-CM**

Clinical Classifications Software (CCS) for ICD-9-CM: groups similar ICD-9-CM diagnosis and procedure codes into broad clinical or procedure categories

## **ICD-10-CM/PCS**

Clinical Classifications Software Refined (CCSR) for ICD-10-CM and ICD-10-PCS: groups similar ICD-10-CM diagnosis codes or ICD-10-PCS procedure codes into broad clinical or procedure categories

## **CPT and HCPCS Level II**

Clinical Classifications Software for Services and Procedures (CCS-Services and Procedures): groups similar CPT and HCPCS Level II codes into broad procedure categories

# CCS for ICD-9-CM Identifies Broad Clinical and Procedure Categories



- CCS for ICD-9-CM categorizes both diagnoses and procedures
  - ▶ 283 diagnosis categories; 231 procedure categories
- Categories are numeric and generally ordered to follow ICD-9-CM Code Book
  - ▶ Examples:
    - CCS Category 2 Septicemia
    - CCS Category 80 Appendectomy
- Applicable on both inpatient and outpatient data



# CCSR for ICD-10-CM Diagnoses Identifies Broad Clinical Categories



- 21 high-level groupings (i.e., body systems) identified by first three characters of the CCSR category
  - ▶ Examples:
    - CIR Diseases of circulatory system
    - NEO Neoplasms
- Over 530 CCSR categories with six-character identifiers
  - ▶ Examples:
    - CIR007 Essential hypertension
    - NEO023 Bone cancer
- Applicable on both inpatient and outpatient data

# Difference #1: CCSR Category Name Identifies Body System

## Category Related to Acute Myocardial Infarction (AMI)

- CCS for ICD-9-CM diagnoses
  - ▶ Categories are numeric
- CCSR for ICD-10-CM
  - ▶ Categories start with three-character body system abbreviation followed by three digits

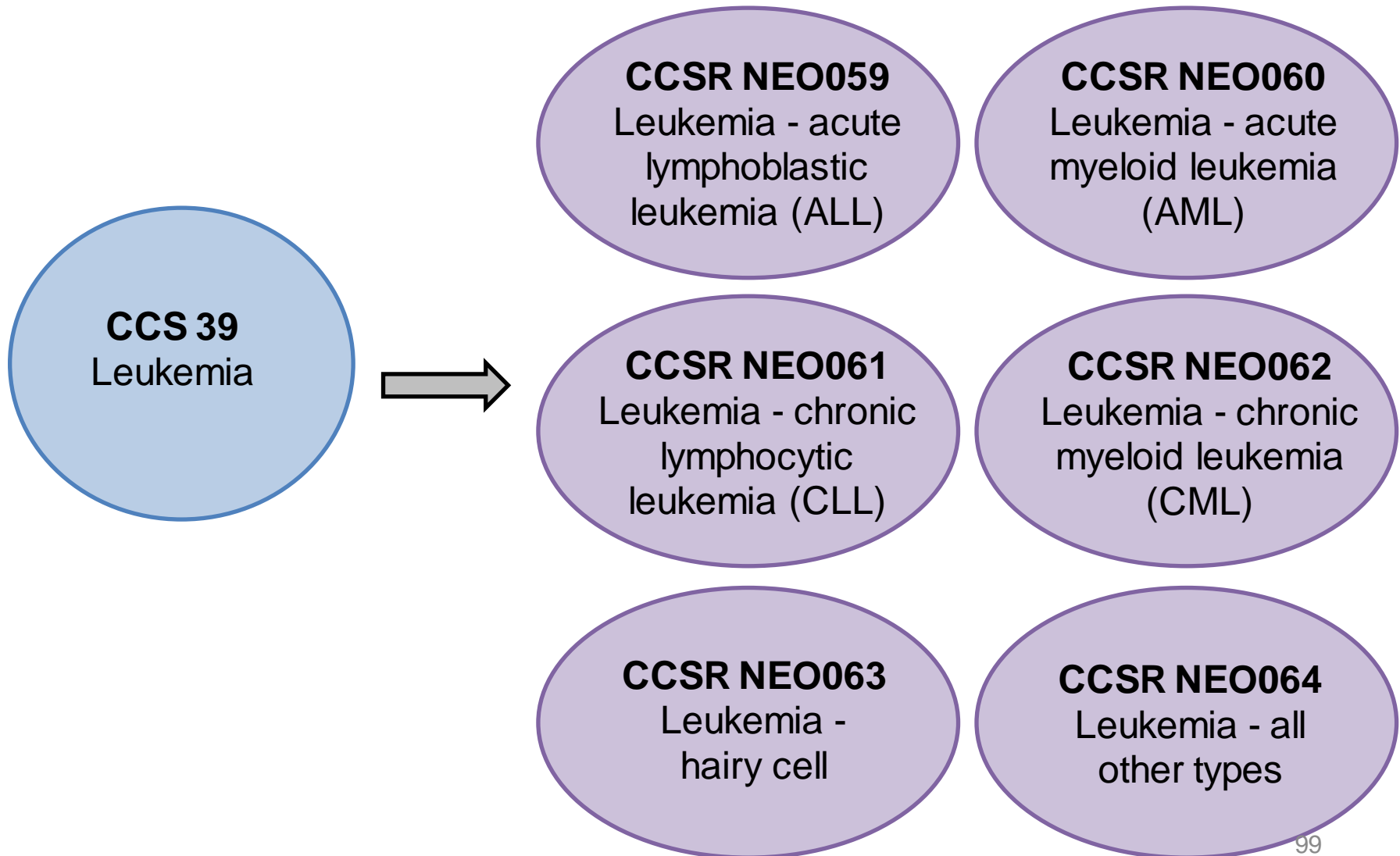
**CCS 100**

### **CCSR CIR009**

**CIR** identifies the body system of diseases of the circulatory system

**009** identifies this as the AMI category under the CIR body system

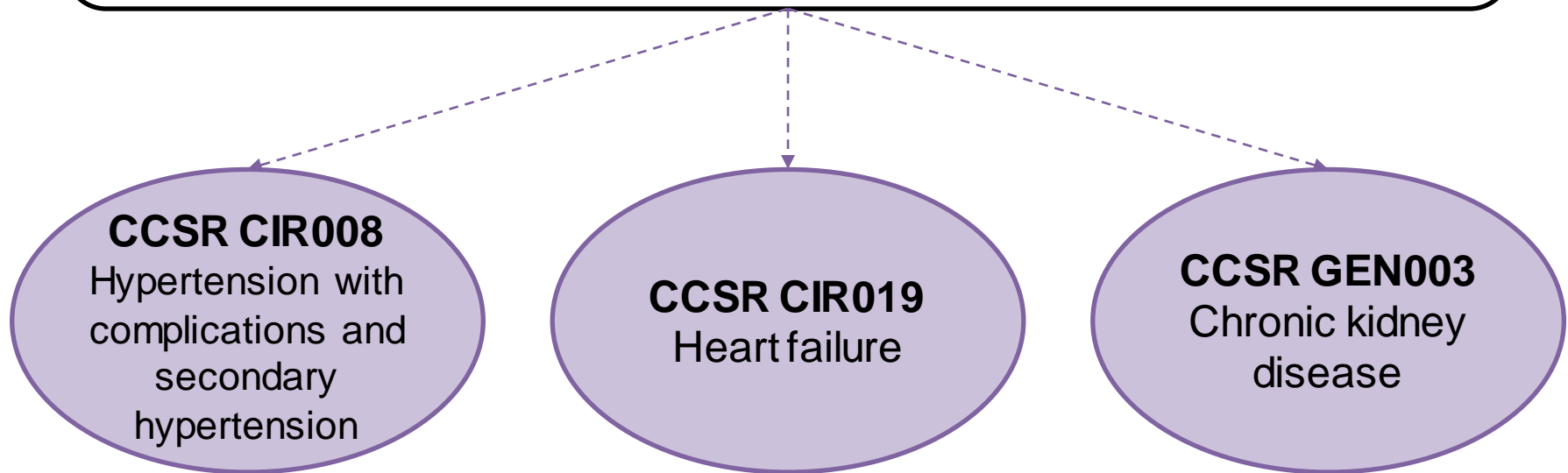
# Difference #2: More Specificity in the CCSR Categories



# Difference #3: Cross-Classification of Codes in CCSR Categories

## Diagnosis Code I13.0

Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease



# Default CCSR Categorization Scheme Available

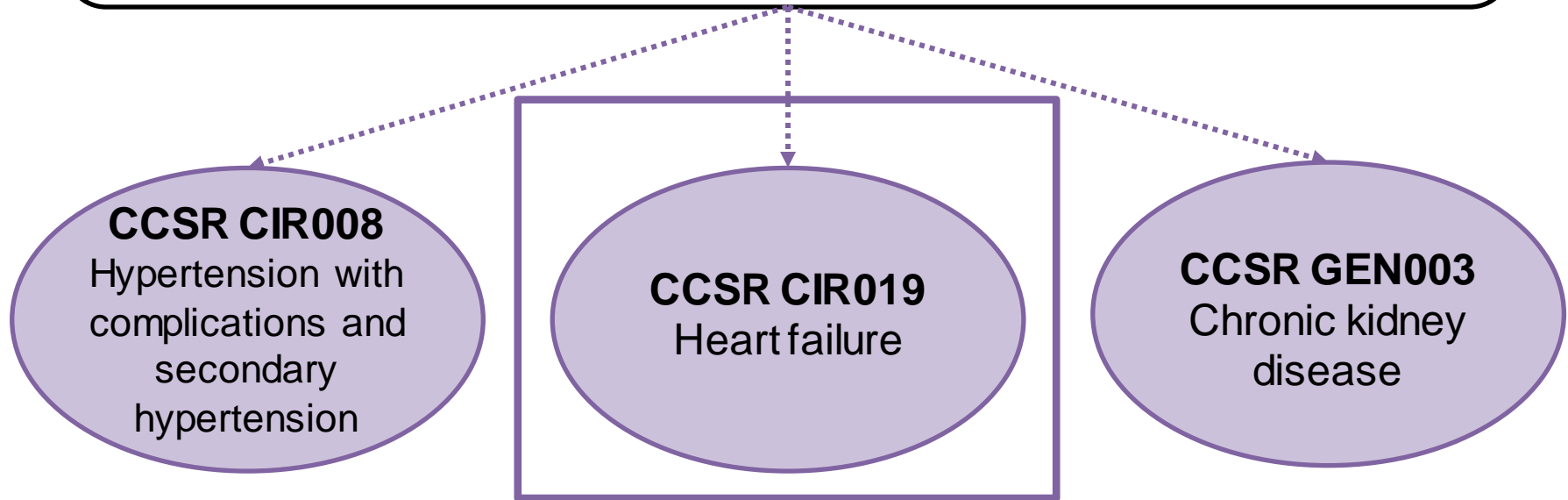


- For some applications, such as ranking hospitalizations by the principal or first-listed diagnosis, a mutually exclusive default categorization scheme is available
- Default CCSR assignment based on hierarchical guidelines that relied on clinical coding rules, clinical input on the etiology/pathology of diseases, coding input, and standards from other Federal agencies
  - ▶ Users may choose to assign different default CCSR categories for ICD-10-CM codes, based on their own needs and preferences

# Example of Default CCSR Assignment

## Diagnosis Code I13.0

Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease

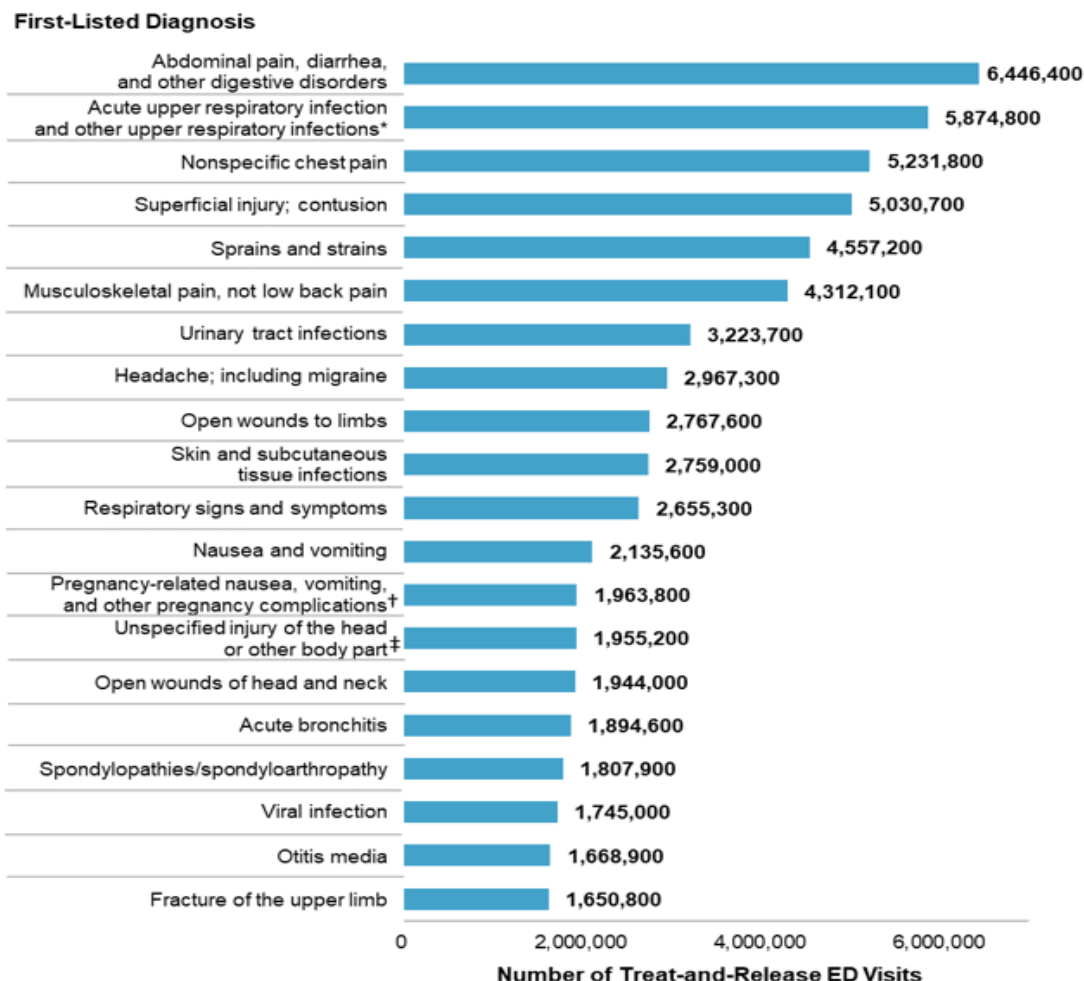


## Default CCSR

The manifestation (i.e., heart failure) is considered more severe than the underlying causes (i.e., hypertension and chronic kidney disease).

# HCUP Statistical Briefs Often Use the CCSR for ICD-10-CM Diagnoses

**Figure 2. Top 20 first-listed diagnoses with the highest number of treat-and-release ED visits, 2018**



Source: Weiss AJ (IBM Watson Health), Jiang HJ (AHRQ). Most Frequent Reasons for Emergency Department Visits, 2018. HCUP Statistical Brief #286. December 2021. Agency for Healthcare Research and Quality, Rockville, MD.  
[www.hcup-us.ahrq.gov/reports/statbriefs/sb286-ED-Frequent-Conditions-2018.pdf](http://www.hcup-us.ahrq.gov/reports/statbriefs/sb286-ED-Frequent-Conditions-2018.pdf).

# CCSR for ICD-10-PCS Procedures Identifies Broad Procedure Categories



- 31 high-level groupings (i.e., clinical domains) identified by first three characters of the CCSR category
  - ▶ Examples:
    - CAR Cardiovascular procedures
    - NCM Nuclear medicine
- 326 CCSR categories with six-character identifiers
  - ▶ Examples:
    - CAR003 Coronary artery bypass grafts (CABG)
    - NCM001 Planar nuclear medicine imaging
- Applicable to inpatient data only



# Difference #1: CCSR Category Name Identifies Clinical Domain

- CCS for ICD-9-CM procedures
  - ▶ Categories are numeric
- CCSR for ICD-10-PCS
  - ▶ Categories start with three-character clinical domain abbreviation followed by three digits

## Category Related to Kidney Transplant

**CCS 105**

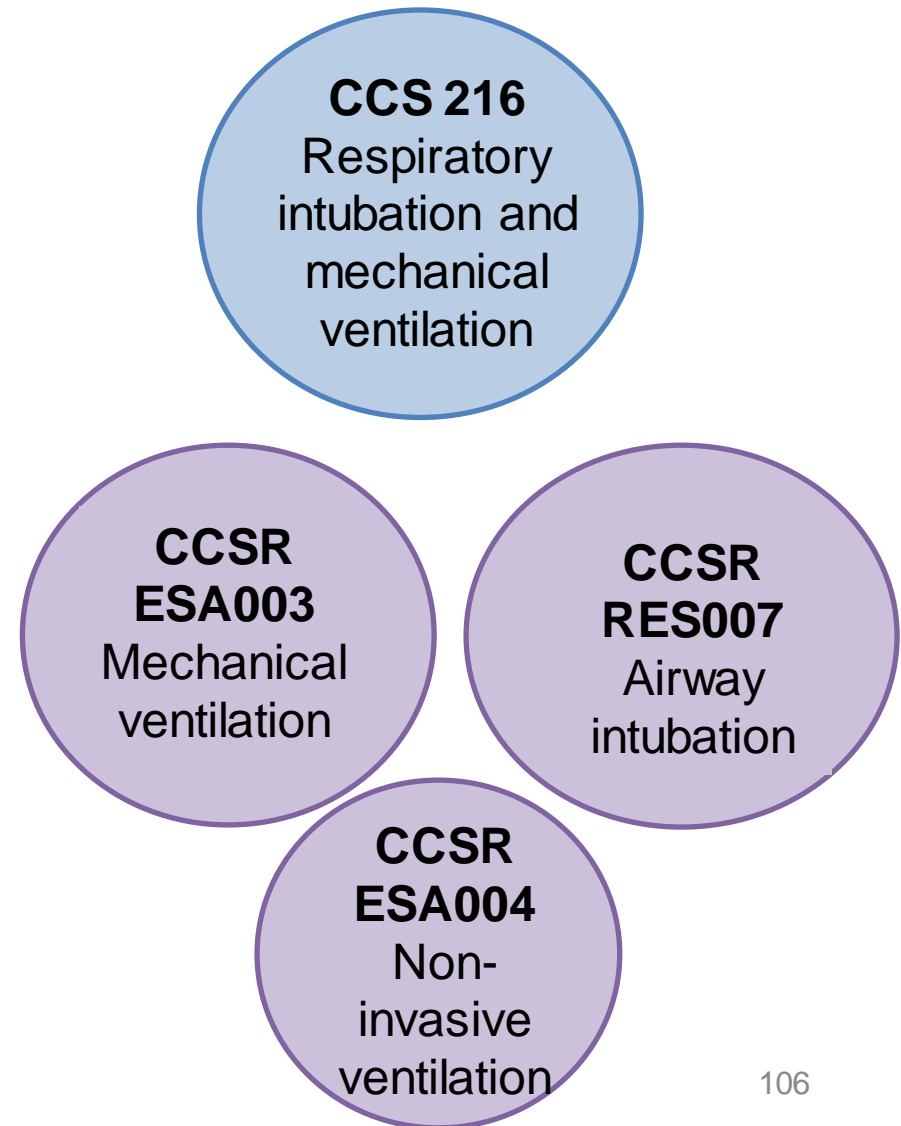
### **CCSR URN011**

**URN** identifies the clinical domain of Urinary System Procedures

**011** identifies this as the kidney transplant category under the URN clinical domain

# Difference #2: More Specificity in the CCSR Categories

- CCS for ICD-9-CM procedures
  - ▶ 231 categories
- CCSR for ICD-10-PCS
  - ▶ 326 categories
  - ▶ More clinically specific categories
  - ▶ Fewer categories named “other procedures”



# Most Common Procedures for Age 18-44 Years



## Most Common Procedures, Age 18-44 Years, Maternal Stays Included

Rank	All-Listed Procedures	Number of Inpatient Stays	Percent of Inpatient Stays, Ages 18-44
1	PGN002: Spontaneous vaginal delivery	2,259,939	27.0
2	PGN003: Cesarean section	1,128,950	13.5
3	PGN004: Assisted vaginal delivery	1,074,425	12.9
4	MST021: Perineal muscle laceration repair (2nd degree obstetrical and other)	673,655	8.1
5	ADM007: Intravenous induction of labor	670,605	8.0

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019.

**The list of procedures for this age group would be very different if maternal cases were excluded.**

# Most Common Procedures for Age 18-44 Years



## Most Common Procedures, Age 18-44 Years, Maternal Stays Excluded

Rank	All-Listed Procedures	Number of Inpatient Stays	Percent of Inpatient Stays, Ages 18-44
1	CAR024: Venous and arterial catheter placement	293,320	3.5
2	ESA003: Mechanical ventilation	167,895	2.0
3	ADM001: Transfusion of blood and blood products	154,275	1.8
4	IMG008: Ultrasonography	122,555	1.5
5	RES007: Airway intubation	119,630	1.4

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019.

# CCS-Services and Procedures Identifies Broad Procedure Categories



- Over 230 CCS categories that include two types of HCPCS codes:
  - ▶ HCPCS Level I codes (CPT codes)
  - ▶ HCPCS Level II codes
- Categories are numeric and identical to the CCS for ICD-9-CM
  - ▶ Additional specific categories unique to professional service codes in CPT/HCPCS (e.g., telehealth)
- Applicable to outpatient data only

# Leading In-Scope Ambulatory Surgery Encounters in the U.S., 2018



CCS for Services and Procedures Category	AS Encounters (N), Weighted	Total Charges (\$ Billions)
015: Lens and cataract procedures	1,057,991	10.2
084: Cholecystectomy and common duct exploration	501,264	11.5
160: Other therapeutic procedures on muscles and tendons (e.g., arthroscopic shoulder rotator cuff repair)	408,313	7.1
085: Inguinal and femoral hernia repair	358,967	8.0
086: Other hernia repair (e.g., umbilical hernia repair)	319,699	7.9
124: Hysterectomy, abdominal and vaginal	264,211	10.4
048: Insertion, revision, replacement, removal of cardiac pacemaker or cardioverter/defibrillator	217,917	17.3
225: Conversion of cardiac rhythm	137,130	13.5
158: Spinal fusion	69,720	4.0
026: Other therapeutic ear procedures (e.g., cochlear device implant)	25,913	1.5
049: Other OR heart procedures (e.g., septal defect repair)	12,060	0.8

Abbreviations: AS, ambulatory surgery; OR, operating room.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), Nationwide Ambulatory Surgery Sample (NASS), 2018

# Consideration #3: Defining Condition(s) or Procedure(s) of Interest



What HCUP Software  
Tools Help Identify  
Surgical Procedures?

# HCUP Software Tools for Refining Procedure Code Categories



**Procedure Classes:** Helpful for analyses that aim to identify diagnostic versus therapeutic procedures and limit procedures to those expected to be performed in the operating room (OR)

Procedure Classes for ICD-9-CM

Procedure Classes Refined for ICD-10-PCS

**Surgery Flags:** Helpful for analyses that aim to identify surgical procedures based on invasiveness

Surgery Flags for ICD-9-CM

Surgery Flags for Services and Procedures (relevant for CPT codes)

*No Surgery Flags tool available for ICD-10-PCS*



# Procedure Classes Identify OR Procedures

- Two versions: ICD-9-CM procedures and ICD-10-PCS procedures
  - Facilitate health services research by allowing the researcher to readily determine whether a procedure is diagnostic or therapeutic or expected to be performed in an OR (i.e., major)
  - Assigns each procedure code to one of four categories:
    - ▶ Minor diagnostic
    - ▶ Minor therapeutic
    - ▶ Major diagnostic
    - ▶ Major therapeutic
- } Operating room procedures

# Most Common Procedures for Age 0-17 Years

## Most Common Procedures, Age 0-17 Years

Rank	All-Listed Procedures	Number of Inpatient Stays	Percent of Inpatient Stays, Ages 0-17
1	ADM010: Vaccinations	1,201,035	23.1
2	MRS001: Circumcision	961,915	18.5
3	ENT004: Diagnostic audiology	270,180	5.2
4	EST002: Phototherapy	246,910	4.7
5	ESA004: Non-invasive ventilation	190,365	3.7

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019.

**The procedures above are predominantly classified as minor diagnostic or minor therapeutic procedures and there is a chance these are underreported.**

# Most Common Operating Room Procedures for Age 0-17 Years



## Most Common Operating Procedures, Age 0-17 Years

Rank	All-Listed Operating Room Procedures	Number of Inpatient Stays	Percent of Inpatient Stays, Ages 0-17
1	GIS008: Appendectomy	41,455	0.8
2	MST012: Bone fixation (excluding extremities)	18,075	0.3
3	MST030: Musculoskeletal procedures, NEC	14,385	0.3
4	MST010: Femur fixation	13,310	0.3
5	MST013: Spine fusion	12,900	0.2

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2019.

**Prior to limiting to OR procedures, top 5 CCSR categories for this age group included vaccinations, circumcision, diagnostic audiology, phototherapy and non-invasive ventilation.**

# Surgery Flags Identify Surgeries

- Two versions: ICD-9-CM procedures and subset of CPT procedures
- Codes identified as *one* of the following:

**Narrow** surgeries, usually major therapeutic

**Broad** surgeries, usually major diagnostic or invasive minor therapeutic

**Neither** [narrow nor broad], usually minor diagnostic

- Assignment based on the following characteristics:

Does the procedure need to be performed in an OR (i.e., is it a major procedure)?

Is the purpose of the major or minor procedure to determine the diagnosis of illness (diagnostic) or to treat a condition (therapeutic)?

How invasive is the procedure to the human body?

Does the procedure require anesthesia or sedation for pain control?

# Using CCS and Surgery Flags Software for Services and Procedures



## Percentage of Pooled SASD Records That Are Narrow or Broad Surgeries Within CCS-Services and Procedures Categories

CCS-Services and Procedures Category	Percentage of Total Category Records		
	Narrow	Broad	Neither
85: Inguinal and femoral hernia repair	100.0	0.0	0.0
87: Laparoscopy	61.3	38.6	0.0
146: Treatment for the fracture or dislocation of hip and femur	43.3	20.7	36.0
214: Traction, splints, and other wound care	0.1	0.5	99.5

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Ambulatory Surgery and Services Databases (SASD) for California, Florida, Nebraska, New Jersey, and South Carolina, 2018.

# Consideration #3: Defining Condition(s) or Procedure(s) of Interest



Which Diagnosis or  
Procedure  
Classification Is Best?

# Choosing How to Classify a Condition or Procedure

- Discussed various options for defining conditions and procedures
  - ▶ Individual ICD-9-CM, ICD-10-CM/PCS, or CPT/HCPCS Level II codes
  - ▶ MS-DRGs, MDCs, APR-DRGs
  - ▶ Broad clinical or procedure groupings based on HCUP software tools (e.g., CCS, CCSR)
  - ▶ Surgical procedures based on HCUP software tools (e.g., Procedure Classes, Surgery Flags)
- Decision is based on user's analysis
- Let's consider some example research questions ...



# Which Classification Works Best?

What is the trend in total procedure volume for *percutaneous coronary intervention (PCI)* from 2016 to 2020 (based on the National Inpatient Sample [NIS])?

ICD-9-CM

ICD-10-PCS

CCSR for  
ICD-10-PCS

CCS-Services  
and  
Procedures





# Which Classification Works Best?

What is the trend in total procedure volume for *percutaneous coronary intervention (PCI)* from 2016 to 2020 (based on the National Inpatient Sample [NIS])?

ICD-10-PCS

CCSR for  
ICD-10-PCS\*

\*CCSR for ICD-10-PCS category CAR004, Percutaneous coronary interventions (PCI)



# Which Classification Works Best?

How do national 30-day all-cause readmission rates differ between *cardiovascular* and *respiratory conditions* in 2019 (based on the Nationwide Readmissions Database [NRD])?

CCS for  
ICD-9-CM

CCSR for  
ICD-10-CM

MS-DRG

MDC



# Which Classification Works Best?

How do national 30-day all-cause readmission rates differ between *cardiovascular* and *respiratory conditions* in 2019 (based on the Nationwide Readmissions Database [NRD])?

CCSR for  
ICD-10-CM\*

MDC

\*CCSR for ICD-10-CM is organized into 21 body systems identified by first three-characters of CCSR category.

# CCSR for ICD-10-CM Body System vs. MDC



- While both the CCSR body systems and MDCs represent similar broad groups, there are notable differences in how categories are defined and their ultimate purpose
  - ▶ CCSR for ICD-10-CM categories are designed to be clinically homogeneous
  - ▶ MDCs are designed to group patients with similar expected resource use



# Which Classification Works Best?

What are the top 10 most common cardiovascular procedures for ED admissions in the 2014 Nationwide Emergency Department Sample (NEDS)?

**CCS for  
ICD-9-CM**

**CCSR for  
ICD-10-CM**

**CCSR for  
ICD-10-PCS**

**CCS-Services  
and  
Procedures**



# Which Classification Works Best?

What are the top 10 most common cardiovascular procedures for ED admissions in the 2014 Nationwide Emergency Department Sample (NEDS)?

**CCS for  
ICD-9-CM**

\*The NEDS will need to be limited to ED admissions using the NEDS data element HCUPFILE.



# Which Classification Works Best?

What is the number of major therapeutic heart valve procedures performed as an ambulatory surgery in the 2018 Florida SASD?

**CCSR for  
ICD-10-PCS**

**Procedures  
Classes  
Refined for  
ICD-10-PCS**

**CCS for  
Services and  
Procedures**

**Surgery Flags  
Software for  
Services and  
Procedures**



# Which HCUP Tool(s) Best Supports the Research Question?

What is the number of major therapeutic heart valve procedures performed as an ambulatory surgery in the 2018 Florida SASD?

**CCS for  
Services and  
Procedures**

**Surgery Flags  
Software for  
Services and  
Procedures**



# Consideration #3: Defining Condition(s) or Procedure(s) of Interest



Are There Enough  
Cases to Support Your  
Analysis?

# Diagnosis and Procedure Frequency Tables for Nationwide Databases



- Frequencies of diagnosis and procedure codes (individually and grouped by clinical category)
- Only available for the HCUP nationwide databases (NIS, KID, NASS, NEDS, NRD)
  - ▶ Under “**Data Elements**” section of the respective Database Documentation pages

## Data Elements

- [NIS Description of Data Elements](#)
  - [Prior Years](#)
- [NIS Summary Statistics](#)
- Frequencies by Diagnosis and Procedure Codes
  - [NIS 2016-2020 with ICD-10-CM/PCS](#) (Excel file, 19.8 MB)
  - [NIS 2000-2014 with ICD-9-CM](#) (Excel file, 11.5 MB)
- Prior to Data Year 2012
  - [Availability of AHA Hospital Identifiers](#)
  - [Why the NIS should not be used to make State-level estimates](#)

# Checking Number of Cases in State Databases



- Can estimate whether States will have low volume for diagnoses or procedures in Diagnosis and Procedure Frequency tables
  - ▶ For example, ~3,100 weighted records in 2020 NIS have any-listed diagnosis of CCSR for ICD-10-CM NEO011 Cardiac cancers
    - If examining this condition in any one 2020 SID, you can expect a relatively low number of records
- Can also use [HCUPnet](#), our free online query tool
  - ▶ Statistics available only for select States

# Overview of the HCUP User Support Website

What Information Is  
Available on the  
HCUP User Support  
(HCUP-US) Website?

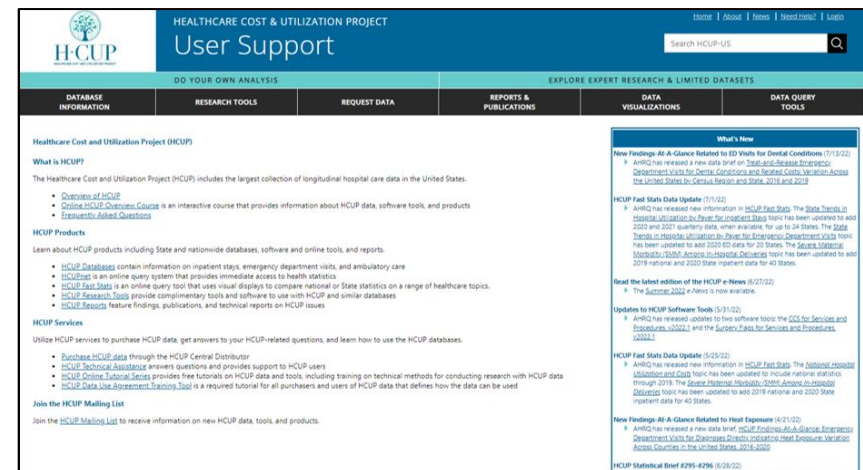
# HCUP User Support Website



- Find detailed information on HCUP databases, tools, and products
- Access HCUP resources such as HCUP Statistical Briefs, HCUP Fast Stats, and the HCUP Central Distributor
- Find comprehensive list of HCUP-related publications and database reports
- Access technical assistance

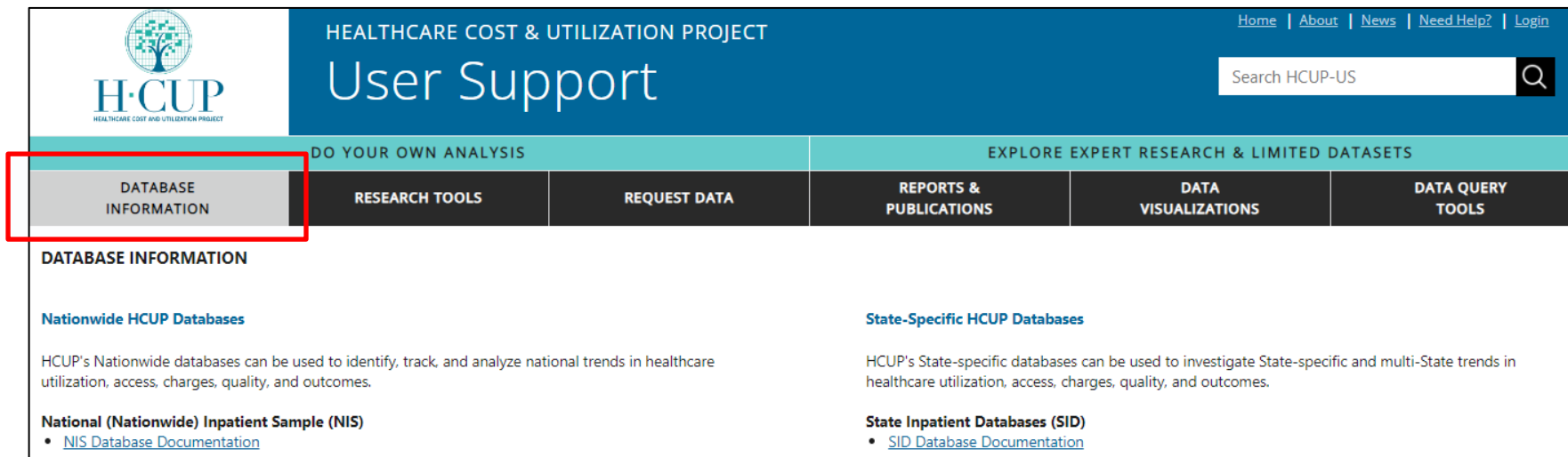
Visit us at

[www.hcup-us.ahrq.gov](http://www.hcup-us.ahrq.gov)



# HCUP-US

## Databases Section



HEALTHCARE COST & UTILIZATION PROJECT

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<b>DATABASE INFORMATION</b>	RESEARCH TOOLS	REQUEST DATA	REPORTS & PUBLICATIONS	DATA VISUALIZATIONS	DATA QUERY TOOLS

#### DATABASE INFORMATION

##### Nationwide HCUP Databases

HCUP's Nationwide databases can be used to identify, track, and analyze national trends in healthcare utilization, access, charges, quality, and outcomes.

**National (Nationwide) Inpatient Sample (NIS)**

- [NIS Database Documentation](#)

##### State-Specific HCUP Databases

HCUP's State-specific databases can be used to investigate State-specific and multi-State trends in healthcare utilization, access, charges, quality, and outcomes.

**State Inpatient Databases (SID)**

- [SID Database Documentation](#)

Includes comprehensive documentation for each database, including:

- ▶ **Detailed reports** introducing users to the database (all databases)
- ▶ **Description of Data Elements** page (nationwide databases)
- ▶ **Availability of States Across Years** table (State databases)
- ▶ **Availability of Data Elements and Descriptions by Year** page (State databases)
- ▶ **Availability of HCUP Revisit Variables Across States and Years** page (State databases)

# Example: NIS Documentation

## National (Nationwide) Inpatient Sample (NIS) Database Documentation

### Description of NIS Database

- [NIS Overview](#)
  - [HCUP Partners in the NIS](#)
- Introduction to the NIS
  - 2020 (PDF file, 1.1 MB; [HTML](#)) ←
  - [Prior Years](#)
- [NIS Related Reports](#)
  - [Prior Years](#)
- [Checklist for Working With the NIS](#)

### Restrictions on Use

- [HCUP Data Use Agreement Training](#)
- Data Use Agreement for the National (Nationwide) Databases (PDF file, 260 KB; [HTML](#))
- [Requirements for Publishing with HCUP Data](#)

### File Specifications and Load Programs

- [NIS File Specifications](#)
- [Nationwide SAS Load Programs](#)
- [Nationwide SPSS Load Programs](#)
- [Nationwide Stata Load Programs](#)

### Data Elements

- [NIS Description of Data Elements](#)
  - [Prior Years](#)
- [NIS Summary Statistics](#)
- Frequencies by Diagnosis and Procedure Codes
  - [NIS 2016-2019 with ICD-10-CM/PCS](#) (Excel file, 12.5 MB)
  - [NIS 2000-2014 with ICD-9-CM](#) (Excel file, 11.5 MB)
- Prior to Data Year 2012
  - [Availability of AHA Hospital Identifiers](#)
  - [Why the NIS should not be used to make State-level estimates](#)

### Additional Resources for Data Elements

- NIS Severity Measures
  - Overview of Severity Measures (PDF file, 60 KB; [HTML](#))
  - [APR-DRGs Methodology Overview Version 3.1](#) (PDF file, 341 KB)
    - [Prior Years](#)
- HCUP Quality Control Procedures (PDF file, 950 KB; [HTML](#))
- HCUP Coding Practices (PDF file, 171 KB; [HTML](#))
- HCUP Hospital Identifiers (PDF file, 174 KB; [HTML](#))

### ICD-10-CM/PCS Data Included in the NIS Starting With 2015

- [2016 NIS Revised File Structure and New Data Elements](#) (PDF file, 258 KB)
- **Caution:** 2015 NIS includes ICD-9-CM and ICD-10-CM/PCS
  - [2015 NIS Revised File Structure and New Data Elements](#) (PDF file, 304 KB)
- [Additional ICD-10-CM/PCS Resources](#)
- [HCUP Software Tools Tutorial](#)

### 2012 NIS Redesign

- [2012 NIS Redesign Report](#) (PDF file, 2.0 MB)
- [Trend Weights for the 1993-2011 NIS for Consistent Estimates with the Redesign NIS](#)

### Known Data Issues

- [Why the NIS should not be used to make State-level estimates](#)
- [2011](#)
- [2000](#)
- [1998-1999](#)
- [1994-1997](#)
- [1993](#)
- [1988-1992](#)

### NIS Supplemental Files

- [Cost-to-Charge Ratio Files](#)
- [Hospital Market Structure \(HMS\) Files](#)
- [1993-2011 NIS Supplemental Discharge-Level Files](#)
- [NIS Hospital Ownership Files](#)

### HCUP Tools: Labels and Formats

- Format Programs
  - [DRG Formats Program](#) (TXT file, 1.7 MB) *Creates SAS formats to label the values of each DRG and MDC category*
  - [HCUP Formats Program](#) (TXT file, 108 KB) *Creates SAS formats to label the values of selected categorical data elements in HCUP files*
  - [HCUP Diagnosis and Procedure Groups Formats Program](#) (TXT file, 61 KB) *Creates SAS formats to label the values of HCUP Diagnosis and Procedure Groups data elements, including Clinical Classifications Software Refined (CCSR) data elements*
  - [ICD-9-CM Formats Program](#) (TXT file, 910 KB) *Creates SAS formats to label the values of ICD-9-CM Diagnoses and Procedures*
  - [ICD-10-CM Formats Program](#) (TXT file, 12.3 MB) *Creates SAS formats to label the values of ICD-10-CM Diagnoses and Procedures*
  - [Severity Formats Program](#) (TXT file, 836 KB) *Creates SAS formats to label the values of data elements in HCUP Severity Files*

# Example: SID Documentation

## State Inpatient Databases (SID) Database Documentation

### Description of SID Database

- [SID Overview](#)
  - [HCUP Partners in the SID](#)
- [Introduction to the SID](#) (PDF file, 456 KB; [HTML](#))
- [SID File Compositions](#)
  - [Number of Discharges by Year](#)
  - [Number of Hospitals by Year](#)
- [SID Related Reports](#)

### Restrictions on Use

- [HCUP Data Use Agreement Training](#)
- [SID Data Use Agreement](#) (PDF file, 87 KB; [HTML](#))
- [Requirements for Publishing with HCUP Data](#)

### File Specifications and Load Programs

- [File Specifications](#)
  - [File Size by Year](#)
- [SAS Load Programs](#)
- [SPSS Load Programs](#)
- [Stata Load Programs](#)

### Data Elements

- [Availability of States Across All Years](#)
- [Availability of Data Elements and Descriptions by Year](#)
- [Availability of HCUP Revisit Variables Across States and Years](#)
- [Summary Statistics for All States Across All Years](#)

### Additional Resources for Data Elements

- [HCUP Quality Control Procedures](#) (PDF file, 460 KB; [HTML](#))
- [HCUP Coding Practices](#) (PDF file, 138 KB; [HTML](#))
- [HCUP Hospital Identifiers](#) (PDF file, 162 KB; [HTML](#))

### ICD-10-CM/PCS Data Included in the SID Starting With 2015

- [2016 State Databases Revised File Structure and New Data Elements](#) (PDF file, 242 KB)
- **Caution:** 2015 SID Includes ICD-9-CM and ICD-10-CM/PCS Data
  - [2015 State Databases Revised File Structure and New Data Elements](#) (PDF file 105 KB)
- [Additional ICD-10-CM/PCS Resources](#)
- [Tutorial for Loading HCUP Software Tools for ICD-10-CM/PCS](#)

### Known Data Issues

- [2016 SID, SASD, SEDD Multiple States - Income Related Variables](#) (PDF file, 87 KB)
- [Incorrect Mapping of Payer Codes](#) (PDF file, 168 KB)
- [2009 SID Multiple States - Load Programs and File Specs](#) (PDF file, 140 KB)
- [Arkansas SID, 2010-2011](#) (PDF file, 46 KB)
- [Georgia SID, 2014](#) (PDF file, 92 KB)
- [Hawaii SID & SEDD, 2011-2014](#) (PDF file, 75 KB)
- [Iowa SID, 2009-2010](#) (PDF file, 71 KB)
- [Iowa SID, 2013](#) (PDF file, 92 KB)
- [Kentucky SID, 2010](#) (PDF file, 22 KB)
- [Maryland SID, 2006-2009](#) (PDF file, 33 KB)
- [Maryland SID, SASD, SEDD 2008-2017 - Skinny ZIP Code files](#) (PDF file, 87 KB)
  - [Supporting Documentation for the Maryland SID, SASD, SEDD 2008-2017 Skinny ZIP Code files](#) (ZIP file, 759 KB)
- [Massachusetts SID, 2003](#) (PDF file, 22 KB)
- [Mississippi SASD, 2010-2011](#) (PDF file, 24 KB)
- [Nevada SID, 2008](#) (PDF file, 23 KB)
- [New Jersey 2015 SID, SASD, SEDD DNR](#) (PDF file, 75 KB)
- [New Mexico SID, 2013](#) (PDF file, 118 KB)
- [New York SID, 2005-2006](#) (PDF file, 91 KB)
- [North Carolina SID, 2007-2008, discharge disposition](#) (PDF file, 50 KB)
- [North Carolina SID, 2007-2008, charge detail](#) (PDF file, 38 KB)
- [South Carolina SID, 2000](#) (PDF file, 19 KB)
- [Washington SID, 2003-2006](#) (PDF file, 16 KB)

### HCUP Tools: Labels and Formats



# Availability of Data Elements by Year – SID 2020

## HCUP State Inpatient Databases (SID) Availability of Data Elements - 2020


This section provides information on the availability of SID data elements by state for the selected year. Not all data elements are available for all states. "y" indicates that a data element is available for that state in a selected year. "-" indicates that the data element is not available for that state in a selected year.

For a description of how an HCUP data element is coded, restriction on its use, uniform values, and state-specific coding practices, click on the data element.

*Printing Note: This is a long document. Click for [printing instructions](#).*

Data Element	AK	AR	AZ	CA
<a href="#">ADRG</a>	-	-	-	-
<a href="#">ADRGRISKMORTALITY</a>	-	-	-	-
<a href="#">ADRGSEV</a>	-	-	-	-
<a href="#">AGE</a>	y	y	y	y
<a href="#">AGEDAY</a>	-	y	y	y
<a href="#">AGEMONTH</a>	y	y	y	y
<a href="#">AHAID</a>	-	y	-	y
<a href="#">AHOUR</a>	y	y	y	-
<a href="#">AMDC</a>	-	-	-	-
<a href="#">AMONTH</a>	y	y	y	y

# Data Element-Specific Pages: PAY1, General Note



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**PAY1 - Expected primary payer, uniform**

**Documentation Sections:**

- [General Notes](#)
- [Uniform Values](#)
- [State Specific Notes](#)

**General Notes**

PAY1 indicates the expected primary payer (Medicare, Medicaid, private insurance, etc.). To ensure uniformity of coding across data sources, PAY1 combines detailed categories in the more general groups. For example,

- Medicare includes both fee-for-service and managed care Medicare patients.
- Medicaid includes both fee-for-service and managed care Medicaid patients.
- Private insurance (PAY1 = 3) includes Blue Cross, commercial carriers, and private HMOs and PPOs.
- Other (PAY1 = 6) includes Worker's Compensation, CHAMPUS, CHAMPVA, Title V, and other government programs.

The HCUP data element PAY1\_X retains the expected primary payer as provided by the data source. The State Specific Notes for PAY1 include information on how the source values contained in the PAY1\_X are recoded into the HCUP uniform values of PAY1.

When there is a generic category for managed care such as "HMO/PPO" reported under PAY1\_X, it is mapped to private insurance (PAY1 = 3) in the HCUP databases. However, it is possible that hospitals may inadvertently include patients covered by a Medicare managed care program administered by a private insurance company under a generic managed care category.

In the 1988-1997 data, the data element PAY1\_N provides more detailed categories for private insurance and other payers. This data element is discontinued beginning in the 1998 data because of the difficulty of coding the information uniformly across States.

If information on secondary or tertiary payers is provided by the data source, the coding of the associated HCUP variables (PAY2, PAY2\_X, PAY3, and PAY3\_X) is included under the State Specific Notes for PAY1.

HCUP is in the process of defining two new uniform payer variables that identify HMO and PPO payers (HMOPPO1 and HMOPPO2). These variables are under development and are not yet available on the HCUP Nationwide Inpatient Sample (NIS).

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# Data Element-Specific Pages: PAY1, State-Specific Notes

## Colorado

Colorado ←			
(Valid beginning in 2017) ←			
PAY1_X		PAY1 ←	
Value	Description	Value	Description
Medicare	Medicare	1	Medicare
Medicaid	Medicaid	2	Medicaid
Commercial	Commercial	3	Private insurance
Liability	Liability		
Self Pay	Self pay	4	Self-pay
No Charge	No charge	5	No charge
Workers Comp	Worker's Comp	6	Other
Tricare	Tricare		
Other	Other		
Blank	Missing	.	Missing
Other	Any undocumented value	.A	Invalid

# HCUP-US

## Research Tools Section



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### RESEARCH TOOLS

**Tools for ICD-10-CM/PCS**

- Clinical Classifications Software Refined (CCSR)
- Elixhauser Comorbidity Software Refined for ICD-10-CM
- Procedure Classes Refined for ICD-10-PCS
- Chronic Condition Indicator (CCI) for ICD-10-CM (beta version)

**Tools for CPT and HCPCS Level II**

- CCS for Services and Procedures
- Surgery Flags for Services and Procedures

**Tools for ICD-9-CM**

- Clinical Classifications Software (CCS) for ICD-9-CM
- Chronic Condition Indicator (CCI) for ICD-9-CM
- Elixhauser Comorbidity Software for ICD-9-CM
- Utilization Flags for Revenue Center Codes and ICD-9-CM
- Procedure Classes for ICD-9-CM
- Surgery Flags for ICD-9-CM

**HCUP Supplemental Files**

- NIS-Trend Weights Files
- NIS Hospital Ownership Files
- NIS 1993-2002 Discharge-Level Supplemental Files
- KID-Trend File
- Cost-to-Charge Ratio (CCR) Files
- Hospital Market Structure (HMS) Files
- Supplemental Variables for Revisit Analyses
- American Hospital Association (AHA) Linkage Files

**AHRQ Quality Indicators (QIs)**

a researcher's ability to conduct analyses.

**ICD-9-CM**

use with International Classification of Diseases, 9th Revision, Clinical (ICD-9-CM) codes

[Classifications Software \(CCS\) for ICD-9-CM](#)

diagnosis and procedure codes into clinically meaningful categories

[Condition Indicator \(CCI\) for ICD-9-CM](#)

diagnoses as chronic conditions

[Comorbidity Software for ICD-9-CM](#)

secondary diagnoses as comorbidities

[Flags for Revenue Center Codes and ICD-9-CM](#)

specific hospital services based on procedures and revenue center

[Classes for ICD-9-CM](#)


Identifies major, minor, diagnostic and therapeutic procedures

- [Surgery Flags for ICD-9-CM](#)

Identifies codes as narrowly defined therapeutic invasive surgeries or more broadly defined surgeries that include diagnostic invasive procedures

# Example HCUP Tool: CCSR for ICD-10-CM Diagnoses





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### Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses

The Clinical Classifications Software Refined (CCSR) for ICD-10-CM Diagnoses is one in a family of databases and software tools developed as part of the [Healthcare Cost and Utilization Project \(HCUP\)](#), a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP databases, tools, and software inform decision making at the national, State, and community levels.

Contents:

- [Overview of CCSR for ICD-10-CM Diagnoses](#)
- [COVID-19-Related Diagnosis Codes](#)
- [User Guide and Other Resources](#)
- [Data Elements Required for Input Dataset](#)
- [Downloading Information for the Tool and Documentation](#)
- [Archive for the Prior Versions \(Including the ICD-10-CM Beta Versions\)](#)
- [For More Information, Comments, or Questions about the CCSR for ICD-10-CM Diagnoses](#)

### Overview of CCSR for ICD-10-CM Diagnoses


The Clinical Classifications Software Refined (CCSR) for ICD-10-CM diagnoses aggregates more than 70,000 ICD-10-CM diagnosis codes into over 530 clinically meaningful categories. The CCSR is based on the *International Classification of Diseases, 10th Revision, Clinical Modification* (ICD-10-CM). The categories are organized across 21 body systems, which generally follow the structure of the ICD-10-CM diagnosis chapters.

The CCSR for ICD-10-CM diagnoses provides a means by which to identify specific clinical conditions using ICD-10-CM diagnosis codes. The CCSR for ICD-10-CM capitalizes on the specificity of the ICD-10-CM coding scheme by creating new clinical categories that did not exist in previous versions of the CCS tool and allowing ICD-10-CM codes to be classified in more than one category. The CCSR is intended to be used analytically to examine patterns of healthcare in terms of cost, utilization, and outcomes; rank utilization by diagnoses; and risk adjust by clinical condition.

The CCSR for ICD-10-CM diagnoses replaces the beta version of the CCS for ICD-10-CM. The most substantial difference in the CCSR for ICD-10-CM diagnoses compared with the beta versions of the CCS is that individual codes are no longer assigned to mutually exclusive categories (i.e., assigned to one and only one category). Mutually exclusive category assignments have been a design feature of the CCS since its initial release. However, individual ICD-10-CM diagnosis codes sometimes document (1) multiple conditions or (2) a condition and a common symptom or manifestation. Assigning only one CCSR category for these codes would require prioritizing the assignment (and the preferred hierarchy of conditions might be different for different applications).

# Example HCUP Supplemental File: Cost-to-Charge Ratio for Inpatient Files





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### Cost-to-Charge Ratio for Inpatient Files

The HCUP Cost-to-Charge Ratio for Inpatient Files (CCR for Inpatient Files) are hospital-level files designed to supplement the data elements in the SID, NIS, KID, and NRD. [HCUP Cost-to-Charge Ratio for Emergency Department Files](#) (CCR for ED Files) are also available. The CCR Files are part of a family of databases and software tools developed as part of the [Healthcare Cost and Utilization Project \(HCUP\)](#), a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality. HCUP databases, tools, and software inform decision making at the national, State, and community levels.

Contents:

- [Overview of CCR for Inpatient Files](#)
- [Description of the CCR for Inpatient Files](#)
- [File Information](#)
- [Hardware and Software Requirements](#)
- [User Documentation](#)
- [How Can Users Obtain HCUP CCR for Inpatient Files?](#)

[Return to Contents](#)

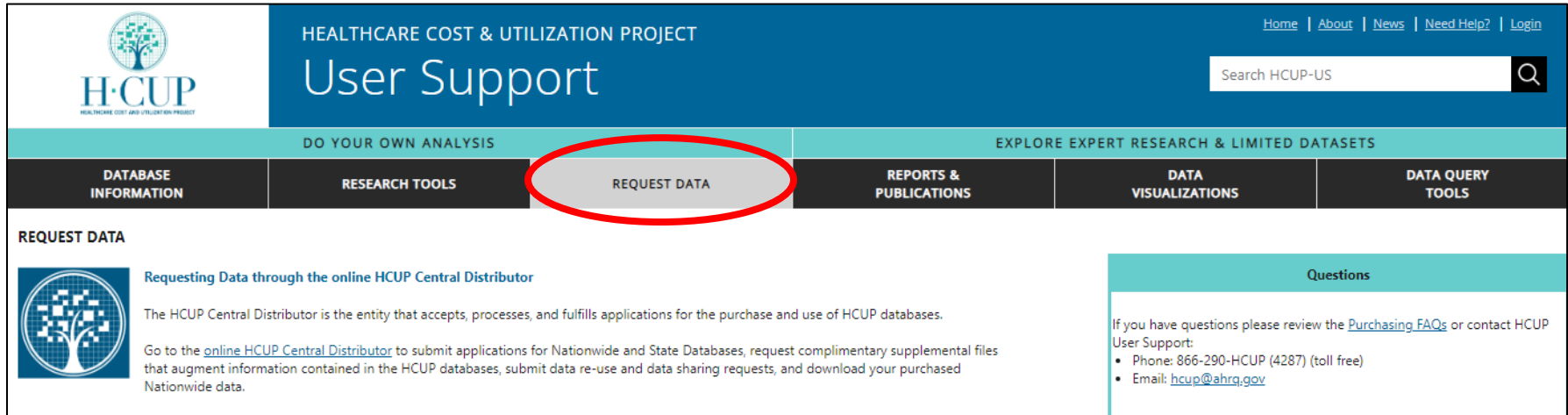
### Overview of the CCR for Inpatient Files

The HCUP Inpatient databases - the SID, NIS, KID, and NRD - contain data on total charges for each hospital discharge in the databases. *Charges* represents the amount that hospitals billed for services; this differs from costs, or the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility. HCUP total charges exclude professional (physician) fees.

The HCUP CCR for Inpatient Files provide users with ratios that will allow the conversion of the HCUP charges into cost estimates. Each file contains hospital-specific cost-to-charge ratios based on all-payer inpatient cost for nearly every hospital in the corresponding SID, NIS, KID, and NRD. Cost information was obtained from the hospital accounting reports collected by the Centers for Medicare & Medicaid Services (CMS). Some imputations for missing values were necessary.

# HCUP-US

## Request Data Section



The screenshot shows the HCUP-US User Support page. The navigation bar includes links for Home, About, News, Need Help?, and Login. A search bar is present with the text 'Search HCUP-US'. The main navigation bar has two sections: 'DO YOUR OWN ANALYSIS' and 'EXPLORE EXPERT RESEARCH & LIMITED DATASETS'. Under 'DO YOUR OWN ANALYSIS', there are links for DATABASE INFORMATION, RESEARCH TOOLS, and REQUEST DATA (which is circled in red). Under 'EXPLORE EXPERT RESEARCH & LIMITED DATASETS', there are links for REPORTS & PUBLICATIONS, DATA VISUALIZATIONS, and DATA QUERY TOOLS. The 'REQUEST DATA' section is expanded, showing a heading 'REQUEST DATA' and a sub-heading 'Requesting Data through the online HCUP Central Distributor'. The text explains that the HCUP Central Distributor is the entity that accepts, processes, and fulfills applications for the purchase and use of HCUP databases. It also provides instructions on how to request data, including submitting applications for Nationwide and State Databases, requesting complimentary supplemental files, submitting data re-use and data sharing requests, and downloading purchased Nationwide data. A 'Questions' section is also visible, providing contact information for HCUP User Support.

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REQUEST DATA

Requesting Data through the online HCUP Central Distributor

The HCUP Central Distributor is the entity that accepts, processes, and fulfills applications for the purchase and use of HCUP databases.

Go to the [online HCUP Central Distributor](#) to submit applications for Nationwide and State Databases, request complimentary supplemental files that augment information contained in the HCUP databases, submit data re-use and data sharing requests, and download your purchased Nationwide data.

Questions

If you have questions please review the [Purchasing FAQs](#) or contact HCUP User Support:

- Phone: 866-290-HCUP (4287) (toll free)
- Email: [hcup@ahrq.gov](mailto:hcup@ahrq.gov)

### Provides access to the online HCUP Central Distributor

- ▶ Submit applications for nationwide and State databases
- ▶ Request complimentary supplemental files that augment information contained in the HCUP databases
- ▶ Submit data re-use and data sharing requests
- ▶ Download your purchased nationwide data

# HCUP-US

## Reports & Publications Section



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Favorites

Statistical Briefs

HCUP Statistical Briefs are simple, descriptive reports on a variety of specific healthcare related issues.

Summary Trend Tables

HCUP Summary Trend Tables provide State-specific monthly trends in hospital utilization accessed through downloadable tables.

Publications

HCUP Publications access lists of HCUP publications, resources, and descriptions of research activities that are based on HCUP data, software products, and tools.

Findings-At-A-Glance

HCUP Findings-At-A-Glance provides snapshots covering a broad range of health policy issues related to hospital use and costs.

Information About Using HCUP Data

Methods Series

HCUP Methods Series reports feature a broad array of methodological information on the HCUP databases and software tools.

ICD-10-CM/PCS Resources

ICD-10-CM/PCS Resources summarize key issues identified by researchers when analyzing health services outcomes using HCUP databases that include International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) coding.

Database Reports

HCUP Database Reports specific to the design and content of each database are available to support your research.

Additional Topics and Archives

Topical Reports

Topical Reports provide research findings or an in-depth look at subjects that may be of particular interest to users of HCUP data

Enhancing Administrative Data

Toolkits and other resources leveraging HCUP data are made available to support enhancing administrative data and improving patient care.


Reports Archive

The Reports Archive includes resources designed for a variety of audiences that are no longer produced by AHRQ.



# HCUP-US

## Data Visualizations Section



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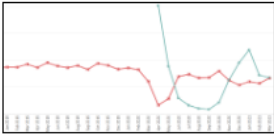
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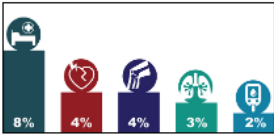
### DATA VISUALIZATIONS



**Data Visualizations**

**HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions**

The [HCUP Visualization of Inpatient Trends in COVID-19 and Other Conditions](#) displays State-specific monthly trends in inpatient stays related to COVID-19 and other conditions, and facilitates comparisons of the number of hospital discharges, the average length of stays, and in-hospital mortality rates across patient/stay characteristics and States. This information is based on the 2018-2020 State Inpatient Databases (SID), plus 2021 quarterly inpatient data, if available.




**HCUP Infographics**

The [HCUP infographics](#) present a visual representation of data and information found in the [HCUP Statistical Brief](#) series and [HCUP Findings-At-A-Glance](#).

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## Data Query Tools Section



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### DATA QUERY TOOLS


#### Data Query Tools



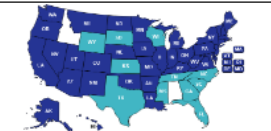
Inpatient



Emergency Department



Community



#### HCUPnet

HCUPnet is an online query system through which users can generate statistics and information on inpatient and outpatient hospital care as well as population-based healthcare in counties.

Supplementary Resources

- [Community-level Statistics \(CLS\) Methodology](#) (PDF File, 538 KB)
- [Readmissions Methodology](#) (PDF File, 155 KB)

#### HCUP Fast Stats

HCUP Fast Stats is an online query tool that uses visual displays to compare national and State-level statistics on a range of healthcare topics. These visual displays include maps, stand-alone graphs, trend figures, and tables that convey complex information in a concise and easy to understand format. HCUP Fast Stats is updated as new quarterly or annual data become available.

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## News & Events Section



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### HCUP e-News

HCUP e-News provides a summary of quarterly activities of the HCUP project. To receive the newsletters and other announcements via email, sign up for the [HCUP Mailing List](#).

- **Current** [Issue #71, Summer 2022](#)
- [Issue #70, Spring 2022](#)

• To view previous years' e-News issues, please refer to the [HCUP e-News Archives](#).

### HCUP Announcements

HCUP Announcements present information on noteworthy events.

- [HCUP Fast Stats](#) data update (August 2022)
- [HCUP Fast Stats](#) data update (July 2022)
- Release of [CCS for Services and Procedures, v2022.1, and the Surgery Flags for Services and Procedures, v2022.1](#) (May 2022)
- [HCUP Fast Stats](#) data update (May 2022)
- [HCUP Findings-At-A-Glance Related to Heat Exposure](#) (April 2022)
- [Release of Procedure Classes Refined for ICD-10-PCS, v2022.2](#) (March 2022)
- [HCUP Data Visualizations](#) (March 2022)
- [HCUP Data Visualizations](#) (January 2022)

• To view previous years' archives, please refer to the [Announcements Archives](#).

### HCUP Calendar

HCUP Calendar provides information on up-coming HCUP events and product releases.

- [Events](#)
- [Database and Product Releases](#)
- [Archives](#)

### HCUP Outstanding Article of the Year Award

AHRQ recognition of outstanding research that used HCUP databases and tools.

- The next [Outstanding Article of the Year Award](#) will take place in 2023, details will be announced this fall.
- [Archive of Award Recipients](#)


### HCUP Virtual Exhibit Booth


The [HCUP Virtual Exhibit Booth](#) provides materials typically offered at the HCUP informational booths that conference attendees can visit.


# HCUP-US

## Technical Assistance Section




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### Resources

#### HCUP FAQs

The [HCUP FAQs](#) provide answers to commonly asked questions about HCUP databases, software tools, supplemental files, and other products.

#### HCUP Databases

The [HCUP Databases](#) page provides detailed database overviews, information on obtaining the databases, and additional resources and documentation to assist you in using the databases. Visit the [Purchase HCUP Data](#) page for additional information on obtaining HCUP databases.

#### HCUP Publishing Requirements

For information on publishing with HCUP data, please review the [HCUP publishing requirements](#).

#### HCUP Virtual Exhibit Booth

The [HCUP Virtual Exhibit Booth](#) provides educational overview materials typically offered for conference attendees at HCUP informational booths.

#### HCUP Index

To search for an HCUP topic, please review the [Index](#).

### HCUP Training & Tutorials

#### HCUP Overview Course

To learn more about HCUP, take the *interactive, modular* [HCUP Overview Course](#) (approximately 90 minutes) that provides information about HCUP data, software tools, and products. The course covers the features, capabilities, and potential uses of HCUP resources.

#### HCUP Data Use Agreement Training Tool

All purchasers and users of HCUP data must complete the [HCUP Data Use Agreement \(DUA\) Training Course](#) (approximately 15 minutes) and sign an HCUP DUA before using the data. The DUA is a legally binding agreement with AHRQ that defines how you can use HCUP data.

#### HCUP Online Tutorial Series

To learn more about concepts essential to conducting effective research with HCUP, refer to the *interactive, modular* [HCUP Online Tutorial Series](#). The courses are designed to answer technical questions you may have related to HCUP data and products.

#### Checklist for Working With HCUP Databases

The [Checklist for Working With the NIS](#) reviews best practices and solutions for common errors. Many of the principles and resources also apply to other HCUP databases.

### Contact Information

#### For Technical Support

If you have questions or need help, please contact us:

- E-mail: [hcup@ahrq.gov](mailto:hcup@ahrq.gov)
- Phone: 866-290-HCUP (4287) (toll free)
- International users, please contact us by e-mail

*Staff reviews messages daily and responds to inquiries within 3 business days.*

#### Media Inquiries

For media-related questions, please contact:

- E-mail: [Bruce.Seeman@ahrq.hhs.gov](mailto:Bruce.Seeman@ahrq.hhs.gov)

#### Join the HCUP Mailing List

Join the [HCUP Mailing List](#) to receive information on new HCUP data, tools, and products.

# Questions/Comments?

Time for questions and/or  
comments

E-mail: [hcup@ahrq.gov](mailto:hcup@ahrq.gov)



# Thank you!



- Thank you for joining Day 1 of the Planning Your HCUP Analysis workshop!
- Please take a moment to share your feedback on today's presentation by responding to the polling questions on the right side of your screen